Essays in Monetary Theory and Finance

By
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Curriculum Vitae

Billy Cheung was born in Hong Kong on the 24th of July, 1980. He attended the Chinese University of Hong Kong from 1999 to 2002, and graduated with a Bachelor of Social Sciences degree in Economics in 2002. He has begun postgraduate studies in Economics in the Chinese University of Hong Kong since 2002. He served Professor Charles Leung as a teaching assistant for Undergraduate New Political Economy class, and Professor Sung Yun Wing for Undergraduate Trade and Investment among the Chinese Economies Class. He pursued his research in Monetary Economics and Finance under the direction of Professor Charles Leung.

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From serving as a teaching assistant for Professor Sung Yun Wing, I have learned invaluable teaching experiences and got more insights into the economics relationship in Among China, Hong Kong and Taiwan.

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Abstract

This paper consists of two sections: The behaviors of income velocity of money and the behaviors of equity premium.

The first section discusses the behaviors of income velocity of money. In recent years, income velocity of money has been extensively examined in the literature[1]. For instance, Michael Bordo (1981) studied the long run behavior of income velocity of money in five advanced countries; Milton Friedman (1982) suggested that there is a relationship between income velocity of money and monetary uncertainty and James and Bradley (1998) examined the temporal relationship between volatility of the money market rate and the income velocity of money of nine industrialized countries. In fact, whether the income velocity of money is stable or at least predictable is crucial to any empirical investigation of the monetary policies. Our research focuses on the time series properties of the income velocity of money, and its relationship with a number of economic factors such as the openness of the country, and the development stage of the economy. This research will exploit the

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cross-country panel data set in the International Financial Statistics and thus will draw important lessons for countries in different stages of economic and financial development. Our empirical evidence shows that around half of the income velocity of money series are deterministic trend and most of those trends are negative. Besides, the higher GDP growth rate, government ineffectiveness and developed counties have higher income velocity of money while higher inflation rate, higher government budget surplus and countries using Euro have lower income velocity of money.

The second section is about the behaviors of the Equity Premium. Since the publication of Prescott and Mehra (1986), more than a hundred articles have been published to explain the equity premium. Despite the volume of the publication, Kocherlakota (1996) claimed that it is still a puzzle. In recent years, there are however some empirical works claiming that the equity premium is vanishing. Since the previous works are exclusively based on Western countries data, this essay contributes to the literature by re-examining the debate with Western countries' as well as Asian countries' data. Our paper computes the equity premium of 31 countries and 34 stock price series. Then, we will test the trends of the equity premium and investigate a number of economics variables to find out what will contribute to the equity premium. Our empirical evidence shows that all equity

premium series are random walk which shows no trend and most equity premium shows negative equity premium. Besides, it has higher equity premium if the country is more autocratic, more open to international trade and have higher inflation rate and higher central government expenditure as a percentage of GDP.

撮要

本文包括兩部份：貨幣流動速率行爲和證卷溢價行爲。

第一部份是貨幣流動速率行爲。近年來，貨幣流動速率有廣泛的研究，例如米高・波多(1981)研究 5 個先進國家的貨幣流動速率；米頓・弗利民(1982)發現貨幣流動速率與貨幣不穩定性的關係與及占士和巴特利(1998)研究 9 個工業國家貨幣流動速率和貨幣市場利率的關係。事實上，貨幣流動速率的穩定性和預測性對貨幣政策研究十分重要。本文集中研究貨幣流動速率的時間序列特性，與及一系列經濟因素，例如國家的對外貿易開放性和經濟發展程度，對貨幣流動速率的影響。本文利用國際財務統計的跨國數據研究不同經濟和金融發展程度國家對貨幣流動速率的影響。我們的實證研究發現有近半數的貨幣流動速率有明顯的下降趨勢。此外，高國民生產總值增長率，低效率政府和已發展的國家有較高的貨幣流動速率；而高通脹率，高政府財政盈餘和使用歐元的國家卻有較低的貨幣流動速率。

第二部份是證卷溢價行爲。自從柏斯葛和美哈(1986)研究出版以來，已經有過百份論文研究證卷溢價，而高卡拿高達(1996)聲稱這仍是個難題。近年來有不少實實證研究發現證卷溢價績漸消失。不過大部份的研究都集中於西方國家，但本文

重新研究西方與及亞洲國家的證卷溢價。本文會計算 31 個國家的 34 個股市指數的證卷溢價趨勢，並試找出影響證卷溢價的經濟因素。本文實證研究發現全部證卷溢價都是隨機走動及大部份呈負數，並沒有單向趨勢。本文並發現一個國家越民主，對國際貿易越開放，有較高的通脹率和有較高的中央政府開支都有較高的證卷溢價。

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Chapter 1

Introduction

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The second section is about the behaviors of income velocity of Equity Premium. Since the publication of Prescott and Mehra (1986), more than a hundred articles have been published to explain the equity premium. Despite the volume of the publication, Kocherlakota (1996) claimed that it is still a puzzle. In recent years,

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there are however some empirical works claiming that the equity premium, and hence the puzzle, is vanishing. Since the previous works are exclusively based on Western countries' data, this essay contributes to the literature by re-examining the debate with Asian countries' data. This paper computes the equity premium of 31 countries and 34 stock price series.

Chapter 2

The Behaviors of Income Velocity of Money

2.1. Introduction

It recent years, income velocity of money has been extensively examined in the literature. However, economists, when compiling their works, often based their investigation on the data of different countries and periods. In order to rectify the weakness, we are going to do a comprehensive investigation into the income velocity of money.

Financial institutional changes and technology dissemination are suggested to be the reasons for the change in the income velocity of money. The most powerful element of the change in the income velocity of money is the collapse of the long-run relationship connecting money with both income and prices. To state its significance, such velocity is stable or at least predictable is essential to any empirical interpretation of the monetarist position and especially relevant to some potentially important problems in the practical conduction of monetary policy.

In this paper, we are going to further investigate income velocity of money by a series of time series tests. We would identify if there is any trend in the income velocity of money. We also examine if there are any factors which will affect the income velocity of money, such as the openness of the country, real output interest rate and the development stage of the economy.

The organization of this section is as follows. Section 2.2 is the literature review. Section 2.3 provides a description of the data used. Section 2.4 discusses the methodology employed. Section 2.5 presents the empirical findings and the interpretations. Section 2.6 serves as a conclusion.

2.2 Literature Review

Income velocity of money is an important topic in macroeconomics. Money is important in the economy for a variety of reasons. For instance, the existence of money can facilitate transactions by reducing the transaction cost or encourages the specialization of labor by encouraging trade. We have chosen to quote prices in terms of money, or, to be more specific, in terms of the high-powered money issued by the government. Every shift of supply or demand for money in the money market must be ultimately accommodated by the quantity of money which is at the center of the macroeconomics stage.

There are three major views about the quantity theory of money: which are the Classical view, the Keynesian view and the Monetarists view[1].

The classical view is that income velocity of money (V) has a constant value because people's spending behavior is immutable. They also regarded real income (Y) as constant since, except perhaps in the very short term during the adjustment of prices following a disturbance, income will be at the full-employment level. Classical economists thought that wages and prices were completely flexible, and as the income velocity of money and real income are constant, it follows that there is a directly proportional relationship between money supply (M) and price level (P); if the money supply increases by x%, then the price level will increase by x%. This is called the quantity theory of money, and constitutes the Classical theory of inflation, that is, the inflation is caused by increases in the money supply.

Fisher's quantity theory of money suggests that the demand for money is purely a function of income, and interest rates have no effect on the demand for money. He

[1] Mushing, Jerry, 2002. Output and the role of money (P. 141-142), World Scientific Publishing Co. Pte. Ltd.

believed that people hold money only to conduct transactions and have no freedom of action in terms of the amount they want to hold. As a result, the demand for money is determined by the level of transactions generated by the level of nominal income and by the institutions in the economy that affect the way people conduct transactions that determine velocity[1].

The classical Cambridge economists at England, such as Alfred Marshall and A. C. Pigou[2], asked how much money individuals would want to hold. They believed that individuals will optimize the mode of payment, for instance whether they will pay by credit or by cash. Likewise, they will optimize the form of asset holding, such as whether putting their wealth in money, which has no interest, or (interest-bearing) bonds, etc. So, they did not rule out the effects of interest rates on the demand of money. They agreed with Fisher that the demand for money would be related to the level of transactions, but they further recognized that the level of people's wealth also affects the demand for money. As wealth grows, an individual needs to store it by holding a larger quantity of assets, one of which is cash. It allowed the possibility that the income velocity of money could be not constant. John Maynard Keynes extended this view and arrived at a different view on the importance of interest rates to the demand of money.

The Keynesian view of the Fisher equation is that it is valid as an identity, but that the Classical assumptions about the income velocity of money and real income are not valid. Income is not always at the full-employment level. Nor can the income velocity of money of circulation be regarded as necessarily constant. The Keynesian view is that if the money supply (M) changes, some combination of the other three

[1] Mishkin, Frederic S. 1997. The economics of money, banking, and financial markets. Addison-Wesley, page 532

[2] Mishkin, Frederic S. 1997. The economics of money, banking, and financial markets. Addison-Wesley, page 532-533

variables (V, P, Y) will be adjusted. The main effect of an increase in money supply is likely to be shown on the level of income, unless it has already reached the full-employment level and cannot increase further. In this situation, the main effect will be on the price level; this is known as demand-pull inflation.

The monetarist approach is a further development of the Classical theory. The monetarists accept that income velocity of money may not be constant, but believe that it is not a function of Money supply. Changes in money supply therefore affect the price level and the amount of real income but not the income velocity of money. The monetarist view is that the main effect is on the price level, though there may be significant effects on real income in the short term. In a longer term, monetarists believe that the effects on real income will be diminished towards zero. Monetarist governments believe that reducing money supply is an appropriate policy at a time of inflation, and the unemployment that this causes will decrease significantly in the longer term.

The monetarist theory of nominal income is based on the demand function of monetary assets which is claimed to be stable and predictable, thus making targeting of money growth feasible. The roots of monetarism lie in the Quantity Theory of Money (QTM) which explains the changes in nominal aggregate expenditure in terms of changes in the money stock and in the velocity of money. The revival of the quantity theory tradition can be traced back to Friedman's analysis of the quantity theory as a money demand theory (Friedman, 1956). His research recognized the importance of the arguments of the demand for money function in the transmission mechanism of monetary policy and also the role of the stability of function in the monetarist analysis.

	Money Velocity (V)	Money Supply (M)	Price Level (P)	Nominal income (Y)
Classical view	Constant	Variable	Variable	Constant
Keynesian view	Variable	Variable	Variable	Variable
Monetarists view	Variable	Variable	Variable	Variable

According to the Money Trends of Milton Friedman (1982), there are five major determinants of the income velocity of money, namely, (1) the division of economic activities between agriculture and industry, (2) real income per capita, (3) population, (4) prices, and (5) interest rates. There are also three early adjustment periods of the income velocity of money: the growing financial sophistication in the US, the postwar effects, and the 1920s-to-1950s shift.

In the US, the income velocity of money kept declining till 1950 and has been rising since then. Bordo and Jonung (1981) suggested that the institutional and financial factors systematically influencing the demand for money in an economy over the entire course of its development are of two types. On the one hand, the process of monetization-which means the growth of the commercial banking system in addition to the expansion of formal market activity at the expense of barter and production for own use-ought to increase the demand for money as an economy grows. On the other hand, the emergence of a variety of nonbank financial intermediaries offering assets are the potential substitute for money, the invention of cash management techniques used to economize on real balances are also supposed to have the opposite effect of lowering the money demand. The first set of effects dominated the early course of economic development but was eclipsed by the second

set in later stages of growth; velocity therefore tends to develop a U-shaped pattern over time. However, there are few researches on predictability of the income velocity of money.

Milton Friedman (1983) suggested that there is a relationship between income velocity of money and monetary uncertainty. According to his hypothesis economic agents undertake portfolio adjustments in response to uncertain changes in the growth of the money supply. This uncertainty with respect to money growth induces economic agents to increase their demand for money, thereby reducing income velocity of money.

Ireland (1991) tested the US regional data from 1929-1988 and claimed that correlations are found between income velocity of money and various proxies for financial sophistication.

James and Bradley (1998) examined the temporal relationship between volatility of the money market rate and the income velocity of money for nine industrialized countries. They found out that the variability of the money market rate helps to predict velocity.

Costas Karfakis (2002) tested two monetarist hypotheses on the Greek data: (1) the predictability of income velocity of money; and (2) the proportionality postulate between nominal income (or, prices) and money. The unit root tests with structural breaks show that the velocity of narrow money can be characterized as a stationary process. The Autoregressive Distributed Lag (ARDL) approach to cointegration indicates that the proportionality postulate between nominal income (or, prices) and money is supported by the data.

Table 2.1 is compares of the data sources and the time series test in different literatures and Table 2.2 is the comparison of literature conclusions and further

investigation areas.

2.3. Data Description

Our research focuses on the examination of the time series properties of the income velocity of money in different countries and investigates the relationship between the income velocity of money and a number of variables, such as interest rate, the development stage of the economy and openness of a country. We use the computer software RATS to examine the time series property and regress the income velocity of money with a number of economics variables.

The quarterly data were obtained from the International Financial Statistics (IFS) by the International Monetary Fund (IMF) financial data, the data stream in the library of the Chinese University of Hong Kong and the economic variables were obtained from Persson and Tabellini (2003), whose observations are averaged over the period from 1990 to 1998 (or the subperiod for which data are available) for the cross section of 85 countries. The definition of the economic variables is shown at the data appendix. Table 2.3a is a summary of countries' data we employed in this paper which are available in the IFS database. Table 2.3b shows the data availability of M1, M2, M3, M4 income velocity of money.

2.4. Methodology

The framework for this research is to examine the time series properties of the income velocity of money in different countries and investigate the relationship between the income velocity of money and a number of economic variables. We will mainly follow the styles of different papers and expand their tests.

In this paper, we base the analysis on the version of the Friedman's version of the QTM as:

$$MV=PY \quad (2.1)$$

Where M represents the nominal money stock which will be defined into narrow money to board money (from M1 to M4); V represents the income velocity of money which depends on interest rates, inflation and real income; P represents the price level and Y represents the real income. Therefore, PY represents the nominal GDP.

The tests we will use are as follows.

2.4.1 Identification of ARIMA mode

We plot the series of income velocity of money and identification of ARIMA model. And then the appropriate model for each series will be chosen, according to the principle of minimized SBC after identifying the model is White Noise in residuals by checking Ljung-Box Q statistics and all the parameters in model are passing t-test.

2.4.2 Unit root test

We use the augmented Dickey-Fuller (ADF) test to check for the presence of unit roots. The ADF test is conducted from the ordinary least squares estimation. ADF test is also used to test for the stationarity of the time series data.

There are several ways to check for the stationarity of a time series. By definition, checking for the time-invariant mean, variance and all autocovariances, is not a practical method. Correlogram is a forthright tool to see if the auto-correlation diminishes as lag length increases, yet it is necessarily imprecise. Alternatively, testing the presence of unit roots is a much formal way. The approach used in this study is the Augmented Dickey-Fuller (ADF) procedure (Dickey and Fuller, 1979,

1981), which is to test the null hypothesis that a series does contain a unit root (i.e., it is nonstationary) against the alternative of no unit root (stationary series).

The following illustration begins with the first-order autoregressive process and the simple Dickey-Fuller test. Consider the AR(1) process $Y_t=\alpha_1 Y_{t-1} +\varepsilon_t$, where $\varepsilon_t \sim$ iid (0, σ2). Subtract yt-1 from both sides of the equation, the equivalent form is: $Y_t = \gamma Y_{t-1} + \varepsilon_t$, where $\gamma=\alpha_1 -1$. Thus, testing H0: $\alpha_1= 1$ against H1: $\alpha_1 < 1$ is simplified to a t-test with the null hypothesis $\gamma= 0$ against the alternative $\gamma< 0$. However, under non-stationarity, the statistic computed does not follow a standard t-distribution but, rather, a Dickey-Fuller τ-distribution constructed by Monte Carlo techniques.

It should be noted that there is no drift term (intercept) or deterministic trend in that simplest form, yet these components are very sensitive to the validity of the unit root estimation. To be precise, Dickey and Fuller (1979, 1981) consider three different models:

$$\triangle Y_t = \gamma Y_{t-1} + \varepsilon_t \qquad (2.2)$$

$$\triangle Y_t = a_0 + \gamma Y_{t-1} + \varepsilon_t \qquad (2.3)$$

$$\triangle Y_t = a_0 + \gamma Y_{t-1} + \alpha_{12} t + \varepsilon_t \qquad (2.4)$$

(2.2) is a pure random walk, (2.3) is a random walk with a drift, and (2.4) is a random walk with both a drift and a deterministic trend. The parameter of interest in this study is gamma, regardless of which form is estimated; if $\gamma= 0$, the $\{Y_t\}$ sequence contains a unit root. Of course, for different forms, the critical values of the t-statistics are distinguished.

It is known that not all time series can be well represented by first-order autoregressive processes such as (2.2) ~ (2.4). If a simple AR (1) DF model is used when in fact Y_t follows an AR(p) process, then the error term will be autocorrelated, which violates the "white-noise" assumption, to compensate for the misspecification

of the dynamic structure of Y_t.

To solve the problem, ADF test extends the model as follow:

$$\triangle Y_t = a0 + \gamma Yt\text{-}1 + \alpha 12t + \Sigma^{p}_{i=2} \beta_i \triangle Y_{t-1+i} + \varepsilon t$$

where $\gamma = -\{1 - \Sigma^{p}_{i=1}\alpha_i\}$

$$\beta = \Sigma^{p}_{i=1}\alpha_i \qquad (2.5)$$

Compared with the simple DF test, (2.5) adds lagged dependent variables $\Sigma^{p}_{i=2}\beta_i \triangle Y_{t-1+i}$ to capture the autocorrelated omitted variables that would otherwise, by default, enter the error term. Thus ADF test can be validly applied to the general process. However, it is important to select the appropriate lag-length; too few lags may result in over-rejecting the null when it is true (type I error), while too many lags may reduce the power of the test (i.e., 1 minus the probability of a type II error). Usually, Akaike information criterion (AIC) and Schwartz Bayesian criterion (SBC) are adopted to determine the suitable lag length.

2.4.3 General Statistics of income velocity of money

We show the general statistics of the income velocity of money, the mean, the standard deviation and the coefficient of variation of different income velocity of money series. Coefficient of variation is a relative measure defined as the ratio of its standard deviation to its mean. We also show the effect of the development stage (developed and developing country) on the income velocity of money. Table 2.4 shows the definition of the developed/developing countries based on the definition in International Finance Statistics. We also try to find out if the currency zone (Euro and non-Euro zone) affects the trend of the income Table 2.5 shows the definition of Euro/non-Euro zone.

2.4.3 Relationship of income velocity of money and economic variables

We try to find out if there is any relationship between mean and standard deviation of the the 90s income velocity of money and a number of economics variables obtained from Persson and Tabellini (2003)

2.4.4 Country income velocity of money regression

We regress the M1 income velocity of money of different countries with a group of macroeconomic variables, such as the Gross Domestic Product (GDP) growth rate, the local short-term market rate, US 3-month inflation rate, equity premium; balance of payment variables, such as the current account balance, capital account balance and financial account balance; and the macroeconomic policies such as the inflation rate and the government budget surplus/deficit.

In our regression, the independent variables are stationary. If the independent variable is stochastic, we take the first difference to make it stationary, which can be referred to the Table 2.6.

According to Lardaro (1993)[1], the Durbin-Watson test is used to test for the presence of autocorrelation. This test is valid when the following conditions are met: (i) the equation includes an intercept term; (ii) the error process is first-order autoregressive; (iii) the equation excludes a lagged dependent variable; and (iv) none of the explanatory variables is stochastic. When the Durbin-Watson test is inconclusive, we add lagged independent variables to correct the problem of autocorrelation[2]. Then, we employ the Breusch-Godgrey test to ascertain the existence of autocorrelated errors. Breusch-Godgrey is a test which regress the OLS

[1] Lardaro, Leonard, 1993 Applied Econometrics. HarperCollins College Publishers. Page 485

[2] Lardaro, Leonard, 1993 Applied Econometrics. HarperCollins College Publishers. Page 491

residuals on their own lags and the original regressor list. The strength of the Breusch-Godgrey test is that it has no inconclusive region. We use this test to compute the test of the null of no serial correlation in the error process.

We regress the income velocity of money with a number of variables. The regression is as follows:

$$\Delta V_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt\ 1} + \sum_{n=1}^{n} \beta_n X_{nt\ 2} + \sum_{p=1}^{p} \beta_p X_{pt\ 3} + \varepsilon_t \qquad (2.6)$$

Where X=f(ti , pr, ept, ii, ir, ca, ka, fa, gb)

The independent variables are as follows.

Independent Variables	
ti	It is the short-term money market rate of the corresponding country. It affects the investment decision in a country and is one of the measures of monetary policy. We believe that it affects the income velocity of money as it affects the individual investment and consumption decision.
pr	It is the quarterly return of the stock index of the corresponding country. It has the wealth effect which will affect the individual investment and consumption decision.
ept	It is the equity premium of the stock market of the corresponding country. It is the excess return of a stock over the risk-free rate. It may affect the income velocity of money as it affects the return an investor can earn in the stock market
ii	It is the US 3-month Treasury Bill rate. US has strong influence over the world economy and may affect the monetary policy of other countries.
ir	It is the inflation rate of the corresponding country. It is an important factor affecting individual investment and consumption decision.
ca	It is the current account balance of the corresponding country. It affects the balance of payment and may affect the monetary policy.

ka	It is the capital account balance of the corresponding country. It affects the balance of payment and the economy of the country
fa	It is the financial account balance of the corresponding country. It affects the balance of payment and the economy of the country
gb	It is the government budget balance. It affects the monetary policy and affects individual investment and consumption decision.

2.4.5 Cross-Country Regression

We have a cross-country regression to investigate the factors which may affect the income velocity of money in the 1990s. We regress the average income velocity of money of different countries in the 1990s with a group of macroeconomic variables to see if there are any variables to explain the income velocity of money in the decade.

We regress the income velocity of money with a number of economic variables. The regression is as follows:

$$\Delta V_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt} + \varepsilon_t \qquad (2.7)$$

Where X=f(gdpg , pr, ir, govef, spl, trade, dev, euro)

The independent variables are as follows.

Independent Variables	
gdpg	It is the Gross Domestic Product growth rate
pr	It is the stock price index quarterly return
ir	It is the inflation rate
govef	It is the government effectiveness
spl	It is the central government budget surplus
trade	It is the sum of exports and imports of goods and services measured as a share of GDP
dev	It is the development level of a country. "1" stands for developed country and "0" stand for developing country

euro	It is the currency zone of a country. "1" stands for Euro zone country and "0" stand for non-Euro zone country

2.5 Empirical Results

This part of the chapter presents, first, the empirical findings of the time series properties of the income velocity of money of different series, the ARIMA model and the unit root results. Second, it presents the general statistics of the income velocity of money and the effect of the development stage (developed and developing country) to the income velocity of money. Third, it presents the relationship between the income velocity of money and a number of economic variables. Fourth, it presents the countries' income velocity of money regression results. Fifth, it presents the cross-country 90s' income velocity of money regression result. Finally, it is the chapter summary.

2.5.1 Time series properties of the income velocity of money

Figures 2.1a-2.1bk are the series of the income velocity of money of different countries. From the figures, we can see that most of the income velocity of money series show trends, and the results from the unit root test in later part confirm it.

Tables 2.7-2.11 are the ARIMA models of different velocity series, M1, M2, M3, M4 and others respectively, by using Rats Program. In Table 7, we find that some countries' income velocities of money are random walk, such as Canada M1 velocity, Finland M1 velocity, Israel M1 velocity, South Africa M1 velocity, New Zealand M2 velocity and Portugal M2 velocity. The unit root results in the later part confirm the result. If the income velocity of money is random walk, it is not easy for the central bank to conduct monetary policies as the effect of the change in money supply may be enlarged or reduced by the income velocity of money and hence the monetary

policy becomes ineffective.

Tables 2.12-2.17 are respectively the unit root results of different income velocity of money series, M1, M2, M3, M4 and other respectively. Table 2.23 is the statistics summary of unit root. From the results, we can find that the ratio of the stochastic to the deterministic trend in M1 income velocity of money is almost one. For the income velocity of money of other series (such as M2 and M3), around 60% of them present a deterministic trend. This shows that it is easier to predict the trend of the M2 or M3 income velocity of money. Hence, for a more stable and effective conduction of monetary policy, central bank is better to target their money supply at M2.

We also find that from the series showing trend, 26 (almost 70%) of them are negative trends but only 7 (around 30%) of it are positive trends. Bordo and Jonung (1997) suggest that the institutional and financial factors that systematically influence the demand for money in an economy over the entire course of its development are of two types. On the one hand, the process of monetization-meaning the growth of the commercial banking system in addition to the expansion of formal market activity at the expense of barter and production for own use-should increase the demand for money as an economy grows. On the other hand, the emergence of a variety of nonbank financial intermediaries offering assets that potentially substitute for money and the invention of cash management techniques used to economize on real balances are expected to have the opposite effect of lowering money demand. Bordo and Jonung's hypothesis is that the first set of effects will dominate early in the course of economic development but will be eclipsed by the second set in later stages of growth; velocity will therefore tend to trace out a U-shaped pattern over time. Our results confirm the findings of Bordo and Jonung (1987). The result shows

that only the Iran M1 velocity, Korea M1 velocity, Turkey M1 velocity, US M1 velocity[1], Indonesia M2 velocity, Italy M2 velocity, US M2 velocity and Sweden boardmoney velocity showed a positive trend. US, Italy and Sweden are well developed countries and it is not surprising that their velocity shows positive trends. Besides, many countries have negative velocity trends which showed that they are still in the process of monetization.

Table 2.18 is the distribution of the income velocity of money differentiated by the Euro zone and non-Euro zone. From the table, we find that no matter the country is in euro or non euro zone, around half of them show negative trends. The other half shows no trends. Hence, the currency zone is not affecting the income velocity of money trend.

2.5.2 Income Velocity of money general statistics

Table 2.19a is the statistics summary of M1 income velocity of money and Table 2.19b is the statistics summary of M1 income velocity of money in 1990s. Table 2.20 is the statistics summary of M2 income velocity of money. Table 2.21 is the statistics summary of M3 income velocity of money. Table 2.22 is the statistics summary of M4 income velocity of money. Table 2.23 is the statistics summary of other income velocity of money. Table 2.24 is the statistics of the income velocity of money of different countries series. From the tables, we notice that M1 income velocity of money has a higher mean and standard deviation; this indicates the M1 income velocity of money has higher volatility. M2 income velocity of money has lower standard deviation. We notice that the mean of the income velocity of money decreases from M1 to M4. This evidence is not surprising as M4 has larger monetary

[1] Ireland (1991) also find the U-shaped pattern of US M1 income velocity of money

base than M3, and also than M2 and M1. The volatility of the monetary base of M4 is lower than that of M1, and as a result, the income velocity of money is also lower. With this phenomenon and the evidence that M2 has low standard deviation, hence, M2 income velocity of money is easier to be predicted and it is better to target the money supply at M2 rather than M1, the effect of which on the nominal GDP is more easily predicted.

As we have discussed before, the more advanced the financial system and the more individuals use charge account or credit card to conduct their transactions, the higher the income velocity of money. So, we may expect that developed countries have higher income velocity of money. Then, we investigate if there are any differences between the income velocity of money behavior of developed and developing countries.

Figure 2.2 shows the distribution of the mean of M1 income velocity of money. From the figure, we notice that developed countries have lower mean (from 0.0-1.9) than developing countries (mostly around 1.0-2.9). The result is not the same as the idea of Irving Fisher (1911). Irving Fisher reasoned that velocity is determined by the institutions in an economy that affects the way individuals conduct transactions. If people use charge accounts and credit cards to conduct transactions and consequently use money less often when making purchases, less money is required to conduct the transactions generated by nominal income, and the income velocity of money will increase. Conversely, if it is more convenient for purchases to be paid with cash or checks, more money is used to conduct the transactions generated by the same level of nominal income, velocity will fall. According to Fisher's reasoning, we believe that the income velocity of money in developed countries will be higher than that of developing countries as people in developed countries, in general, will more

frequently use charge accounts or credit cards to conduct transactions. However, our results show that developing countries have higher income velocities of money than developed countries. This ambivalence may be settled by Bordo and Jonung's (1997) suggestion that the institutional and financial factors that will systematically influence the demand for money in an economy. In developed countries, their financial institutions are better developed. The emergence of a variety of nonbank financial intermediaries offering assets that potentially substitute for money and the invention of cash management techniques used to economize on real balances are thought to the opposite effect of lowering money demand.

Figure 2.3 shows the distribution of the standard deviation of M1 income velocity of money. We notice that most countries' standard deviation is in the interval of 0.00-0.049. However, we observe that developing countries tend to have higher standard deviation, which shows that their income velocity of money is more volatile. If a central bank targets the money supply for conducting monetary policy, the more volatile the income velocity of money, the more difficult it is for the central bank to conduct a stable monetary policy. So, from our results, it is not easy to have a stable monetary policy in developing countries as their income velocity of money is of higher standard deviation.

Figure 2.4 is the distribution of M1 income velocity of money trend and Figure 2.5 is the distribution of income velocity of money trend. From the figure, we can see that no matter it is a developed or developing country, there are more negative trend to be found. So, most countries are still in the stage of monetization.

2.5.3 The relationship between the income velocity of money and economic variables

Figure 2.6 shows the relationship between the M1 income velocity of money

standard deviation and its mean. Except one outlier, we find that the higher the M1 income velocity of money, the more volatile the income velocity of money becomes.

Figure 2.7 demonstrates the relationship of M1 Velocity Mean and the Age of democracy in the 90s. Figure 2.8 is the relationship between M1 Velocity Mean and Central government expenditure as a percentage of GDP in the 90s. Figure 2.9 is the relationship of M1 Velocity Mean and Corruption Perception Index in the 90s. Figure 2.10 is the relationship of M1 Velocity Mean and Gini index on income distribution in the 90s. All of them do not show any special pattern.

Figure 2.11 is the relationship of M1 Velocity Mean and government effectiveness in the 90s. From this figure, we notice that it has a positive relationship between M1 income velocity of money Mean and the government's effectiveness. That is, M1 income velocity of money becomes higher when the government is less effective. This is confirmed by the cross country regression results in the later part.

Figure 2.12 is the relationship of M1 Velocity Mean and Natural log of per capita real GDP in the 90s. Figure 2.13 is the relationship of M1 Velocity Mean and Score of democracy in the 90s. Both of them showed that democracy and the central government's budget do not affect the M1 income velocity of money. The relationship in the figure is not very clear.

Figure 2.14 is the relationship between M1 Velocity Mean and Central government budget surplus or deficit as a percentage of GDP in the 90s. We notice that the higher the central government budget surplus, the lower the income velocity of money. This is proved statistically significant by the cross country regression.

Figure 2.15 is the relationship between M1 Velocity Mean and Sum of exports and imports of goods and services measured as a share of GDP in the 90s. We can find out a slightly negative relationship, the higher the trade as a share of GDP, the

lower the M1 income velocity. However, the results from the cross-country regression demonstrate that this is statistically insignificant.

Figure 2.16 is the relationship between M1 Velocity Mean and Index for openness to international trade in the 90s. We can see no relationship between the openness to international trade and the income velocity of money.

Figure 2.17 is the relationship of M1 Velocity standard deviation and the Age of democracy in the 90s. Figure 2.18 is the relationship between M1 Velocity standard deviation and central government expenditure as a percentage of GDP in the 90s. Figure 2.19 is the relationship between M1 Velocity standard deviation and Corruption Perception Index in the 90s. Figure 2.20 is the relationship between M1 Velocity Variance and Gini index on income distribution in the 90s. Figure 2.21 is the relationship between M1 Velocity standard deviation and Government Effectiveness in the 90s. Figure 2.22 is the relationship between M1 Velocity standard deviation and Natural log of per capita real GDP in the 90s.Figure 2.23 is the relationship between M1 Velocity standard deviation and Score of democracy in the 90s. Figure 2.24 is the relationship between M1 Velocity standard deviation and Central government budget surplus or deficit as a percentage of GDP in the 90s. Figure 2.25 is the relationship between M1 Velocity standard deviation and Sum of exports and imports of goods and services measured as a share of GDP in the 90s. Figure 2.26 is the relationship between M1 Velocity standard deviation and Index for openness to international trade in the 90s. From these figures, the standard deviation of the income velocity of money is not affected by the economic variables.

2.5.4 Country income velocity of money regression results.

In this part, we regress the income velocity of money with the macroeconomic

variables, balance of payment variables and the government budget balance. Table 2.5 shows the regression result.

In the regression, there are eight regressions which show no serial correlation. The eight countries are Brazil, Canada, France, Germany, Hungary, Korea, Peru and Spain. In these eight regressions, there are no variables which are statistically significant for all series. Variables are only statistically significant for one or two countries. The capital account balance is statistically insignificant for all countries.

In the table, we find that one period lagged short term money market rate has a positive effect on Germany's income velocity of money with an estimated effect 0.06, yet a negative effect on Hungary's income velocity of money with estimated effect -0.23. Two periods lagged short term money market rate also has positive effect on Korea's income velocity of money with an estimated effect 1.07. The one period lagged stock index returns has positive effect on Hungary's and Korea's income velocity of money with an estimated effect 2.12 and 97.38 respectively yet it has negative effect on Canada's income velocity of money with an estimated effect -8.16. Two periods lagged stock index return has positive effect on Canada's income velocity of money with an estimated effect 15.83 yet it has negative effect on Korea's income velocity of money with an estimated effect -112.03. Three periods lagged stock index return has negative effect on Canada's income velocity of money with an estimated effect -7.82. The one period lagged equity premium has negative effect on Hungary's and Korea's income velocity of money with an estimated effect -2.18 and -97.19 respectively yet it has positive effect on Canada's income velocity of money with an estimated effect 8.18. Two periods lagged equity premium has negative effect on Canada's income velocity of money with an estimated effect -15.78 yet it has positive effect on Korea's income velocity of money with an

estimated effect 111.74. Three periods lagged equity premium has a positive effect on Canada's income velocity of money with an estimated effect 7.84. One period lagged US 3-month Treasury Bill rate has positive effect on Canada's income velocity of money with an estimated effect 0.11. One period lagged inflation rate has negative effect on France's and Spain's income velocity of money with an estimated effect -2.92 and -2.25 respectively, yet a positive effect on Hungary's income velocity of money with an estimated effect 2.29. Two periods lagged inflation rate has positive effect on Korea's income velocity of money with an estimated effect 12.82. The government budget surplus has positive effect on Korea income velocity of money with an estimated effect 0.03.

For the balance of payment variables, the one period lagged current account balance has positive effect on Korea's and Peru's income velocity of money with the same estimated effect 0.0001, yet it has negative effect on Germany's and Spain's income velocity of money with an estimated effect -0.001 and -0.00001. Two periods lagged current account balance has positive effect on Spain's income velocity of money with an estimated effect 0.00001. One period lagged financial account balance has negative effect with an estimated effect -0.001 and -0.00003 on Germany's and Spain's income velocity of money respectively. Two periods lagged financial account balance has positive effect on Korea's income velocity of money with an estimated effect 0.00006.

We cannot find consistent variables which can explain the income velocity of money by the time series regression. We then follow by checking if any other variables may be significant enough for explaining the income velocity of money. The cross-country regressions are done in the following part.

2.5.5 Cross-Country regression results

We further check the effect of macroeconomic variables on income velocity of money in the 1990s by cross country regression. Table 2.26 is the regression result and Table 2.27 is the correlation coefficient of the variables in the regression.

In the regression, the GDP growth rate, inflation rate, government effectiveness, central government surplus, country development level and currency zone are statistically significant but the stock price index return is statistically insignificant. R^2 indicates that around 79 percent of the variation in the equity premium can be explained by the independent variables.

We find that the GDP growth rate, government effectiveness and development level of a country tend to have positive effect on the income velocity of money. The higher the GDP growth rate and the more developed the country, the higher the income velocity of money is higher. This does not parallel what we have discussed before – the higher the GDP growth rate, the more wealth individuals have. As a result, they have higher money demand relative to income. In this cross-country regression, the variables used are the data in the 1990s. Hence, we believe that in the decade, the growth rate of the GDP corresponded to the development of their financial institutions and financial market, making their income velocity of money higher. Besides, we also notice that the income velocity of money is lower if the government is less effective.

The inflation rate, the central government surplus and the euro zone countries have negative effects on the income velocity of money. That is, the higher the inflation rate and government surplus, the lower the income velocity of money. Countries using Euro as their currency also have a lower income velocity of money.

2.5.4 Chapter Summary

We notice that most of the income velocity of money shows negative trends, that is, the income velocity of money declines in the past ten to thirty years. We find out that developing countries tend to have a higher standard deviation, which shows that their income velocity of money is more volatile. Developed countries tend to have a lower income velocity of money mean. Besides, higher GDP growth rate, ineffective governments and developed counties have positive correlation to the income velocity of money while a higher inflation rate, a bigger government budget surplus and using a single currency (Euro) countries contribute to a lower income velocity of money.

2.6 Conclusion

Studies of the time series properties of the income velocity of money and the relationship of other economic variables are important in monetary policies. Our research focuses on the time series properties of the income velocity of money and the relationship between the income velocity of money and economic variables.

The empirical results obtained by the unit root test and the regressions show that first, around half of the income velocity of money series are deterministic, with M2 and M3 series have more deterministic trends. Second, the majority of the countries have negative trends which show they are still in the stage of monetization, signifying the growth of the commercial banking system in addition to the expansion of formal market activity. Third, developing countries tend to have higher standard deviations, and developed countries tend to have lower income velocities of money. Fourth, higher GDP growth rate, ineffective governments and developed counties contribute to a higher income velocity of money. On the other hand, higher inflation

rates, bigger government budget surpluses and the use of a single currency (Euro) make the income velocity of money lower.

Author	Countries	Period	Data Sources	Test
Bordo & Joung	US, UK, Sweden, Canada, Norway	1870-1986	Boron & Joung [1987]	Unit Root Test, Cointergration, stability of cointergration relationships
James & Bradley	Austria, Australia, Canada, France, Germany, Italy, Japan, Switzerland, UK	1945-1997	International Financial Statistics	Unit Root Test, cointegration test, Grander-causality models
Costas Karfakis	Greek	1948-1997 (annual data)	International Financial Statistics	Unit root tests with structural breaks, the Autoregressive Distributed Lad (ARDL)
Apostolos Sterletis	US	1960:1-1992:12	Federal Reserve Economic Data (FEDR)	Unit-root test Lyapunov exponent estimator
Michael D. Bordo	US, UK, Sweden, Canada, Norway	1880-1986		Unit root test
Peter N. Ireland	US regional data	1870-1986	Andy Atkeson & Rachel can Elkan, Commerce Department's state personal data	Cross Section Regression

Table 1: Summary table of the literature (Comparison of data)

Author	Conclusion	Further Investigation
Bordo & Joung	Institutional change is a good candidate to explain the striking similarities in the long-run behavior of velocity	Expand the test for more countries
James & Bradley	Variability of short term interest rate may help to predict velocity	1. Expand the test for less developed countries 2. Examine the impact of interest rate variability on real output
Costas Karfakis	The shocks which affect the money supply are reflected in the nominal income (or, prices) in a similar way, the velocity movements are predictable	Expand the test for more countries
Apostolos Sterletis	Random walk hypothesis cannot be rejected	
Michael D. Bordo	Institutional variables are significant determinants of velocity in five advanced countries	Further research wound be required by using alternative measures of financial innovation for US and UK
Peter N. Ireland	Correlations found between velocity and various proxies for financial sophistication	

Table 2: Summary table of the literature (Comparison of conclusion)

COUNTRY	VELOCITY	QUARTERLY	TOTAL NUMBER OF DATA
Belgium	M1	80Q1-98Q3	75
Brazil	M1	93Q1-02Q4	39
	M2		
	M3		
	M4		
Canada	M1 SA	87Q1-03Q1	185
China	M1 SA	99Q1-02Q2	14
Denmark	M1 SA	87Q1-03Q1	65
Finland	M1	70Q1-02Q4	131
France	M1 SA	77Q4-98Q4	85
	M2 SA		
	M3 SA		
	M4 SA		
Germany	M1 SA	60Q1-98Q4	156
	M2 SA	69Q1-98Q4	120
	M3 SA	69Q1-98Q4	120
	M4 SA	74Q1-98Q4	100
Hong Kong	M1 SA	96Q4-02Q4	28/12
Hungary	M1 SA	95Q1-02Q4	32
	M2 SA		
	M3 SA		
	M4 SA		
Indonesia	Base money	95Q1-01Q4	28
	M1 SA		
	M2 SA		
Iran	M1 SA	87Q4-99Q4	49
Israel	M1 SA	71Q1-03Q1	129
Italy	M2 SA	74Q4-98Q4	97
Macau	M1 SA	00Q1-03Q1	13
Japan	M1 SA	57Q1-03Q1	185
Korea	M1 SA	60Q1-03Q1	173
Malaysia	M1 SA	91Q1-03Q1	49
Malta	M1 SA	92Q1-03Q1	43
Mexico	M1	85Q4-03Q1	70
	M2		
	M3		

	M4		
Netherlands	M2 SA	77Q1-97Q4	84
New Zealand	M1 SA	87Q2-03Q1	64
	M2 SA		
	M3 SA		
	M3 board SA		
Norway	M1 SA	61Q1-03Q1	169
Peru	M1 SA	84Q1-03Q1	74
Philippines	M1 SA	80Q4-03Q1	90
Poland	M1 SA	95Q1-03Q1	33
Portugal	M1 SA	79Q4-03Q1	77
Russia	M1 SA	93Q4-02Q4	37
South Africa	M1 SA	66Q1-02Q4	148
Spain	M1 SA	70Q1-98Q4	118
	M2 SA		
	M3 SA		
	Board Money SA		
Sweden	M1 SA	80Q1-01Q3	87
Switzerland	M1 SA	74Q4-03Q1	114
Thailand	M1 SA	93Q1-03Q1	41
Turkey	M1 SA	87Q1-99Q2	50
United Kingdom	M1 SA	82Q3-02Q4	82
United States	M1	59Q1-03Q1	177
	M2		
	M3		

SA: Seasonally adjusted data

Table 2.3a:Summary of country's data in IFS

COUNTRY (QUARTERLY)	M1	M2	M3	M4	OTHER
Belgium	*				
Brazil	*	*	*	*	
Canada	*				
China	*				
Denmark	*				
Finland	*				
France	*	*	*	*	
Germany	*	*	*	*	
Hong Kong	*				
Hungary	*	*	*	*	
Indonesia	*	*			Basemoney
Iran	*				
Israel	*				
Italy		*			
Macau	*				
Japan	*				
Korea	*				
Malaysia	*				
Malta	*				
Mexico	*	*	*	*	

Netherlands		*		
New Zealand	*	*	*	M3 Board
Norway	*			
Peru	*			
Philippines	*			
Poland	*			
Portugal	*			
Russia	*			
South Africa	*			
Spain	*	*	*	Boardmoney
Sweden	*			
Switzerland	*			
Thailand	*			
Turkey	*			
United Kingdom	*			
United States	*	*	*	

Table 2.3b: Data Availability of Income Velocity of Money (Quarterly Data)

Sources: International Financial Statistics

COUNTRY	DEVELOPED COUNTRY	DEVELOPING COUNTRY
Belgium	*	
Brazil		*
Canada	*	
China		*
Denmark	*	
Finland	*	
France	*	
Germany	*	
Hong Kong	*	
Hungary		*
Indonesia		*
Iran		*
Israel		*
Italy	*	
Macau		*
Japan	*	
Korea		*
Malaysia		*
Malta		*
Mexico		*
Netherlands	*	
New Zealand	*	
Norway	*	
Peru		*
Philippines		*
Poland		*
Portugal	*	
Russia		*
South Africa		*
Spain	*	
Sweden	*	
Switzerland	*	
Thailand		*
Turkey		*
United Kingdom	*	
United States	*	

Table 2.4: Developed/Developing Country

COUNTRY	EURO COUNTRY	NON EURO COUNTRY
Belgium	*	
Brazil		*
Canada		*
China		*
Denmark		*
Finland	*	
France	*	
Germany	*	
Hong Kong		*
Hungary		*
Indonesia		*
Iran		*
Israel		*
Italy	*	
Macau		*
Japan		*
Korea		*
Malaysia		*
Malta		*
Mexico		*
Netherlands	*	
New Zealand		*
Norway		*
Peru		*
Philippines		*
Poland		*
Portugal	*	
Russia		*
South Africa		*
Spain	*	
Sweden		*
Switzerland		*
Thailand		*
Turkey		*
United Kingdom		*
United States		*

Table 2.5: Euro Country and non-Euro Country

Country	t	ep	gdpg	pr	v	i	ir	ca	ka	fa	gb
Brazil	1	N	N	N	N	1	0	1	1	0	0
Canada	1	N	N	N	1	1	0	0	0	0	0
France	1	N	N	N	1	1	0	0	0	0	0
Germany	1	N	N	N	1	1	0	0	0	0	0
Hungary	1	N	N	N	N	1	0	0	1	0	0
Korea	1	N	N	N	N	1	0	0	0	0	0
Peru	N	N	N	N	1	1	0	0	0	0	0
Spain-IBEX35I	1	N	N	N	1	1	0	0	0	0	0

Table2.6: Stationary of the series,

N: stationary

1: I(1)

Country	Equation
Belgium M1 velocity	Vt= 0.158 - 0.040Vt-1 + 0.920Vt-2 +1.114et-1+et
Brazil M1 velocity	Vt= 1.569 + 1.224Vt-1 - 0.347Vt-2 – 0.658et-1+et
Canada M1 velocity	Vt - Vt-1 = et
China M1 velocity	Vt= 0.122Vt-1 +0.868Vt-2 +1.939et-1+et
Denmark M1 velocity	Vt - Vt-1 = -1.011Vt-1 + 0.8489et-1 +et
Finland M1 velocity	Vt - Vt-1 = et
France M1 velocity	Vt - Vt-1 = 0.003 + et
Germany M1 velocity	Vt - Vt-1 = 0.182Vt-1 -0.082Vt-2+et
Hong Kong M1 velocity	Vt - Vt-1 = -0.702Vt-1 + 1.581et-1 +et
Hungary M1 velocity	Vt - Vt-1 = -0.115Vt-1 -0.639Vt-2+et
Indonesia M1 velocity	Vt - Vt-1 = -0.638 et-1+et
Iran M1 velocity	Vt= 0.451 +1.297Vt-1 -0.326Vt-2 -1.162et-1+et
Israel M1 velocity	Vt - Vt-1 = et
Italy M1 velocity	Vt - Vt-1 = -1.006Vt-1 +0.945et-1 +et
Japan M1 velocity	Vt= 1.424 + 1.055Vt-1 -0.021Vt-2 +et
Korea M1 velocity	Vt= 1.011 -0.448Vt-1 + 0.540Vt-2 + 0.851et-1+et
Macau M1 velocity	Vt- Vt-1= -0.019 + 0.574Vt-1 - 0.811Vt-2 - 2.792et-1+et
Malaysia M1 velocity	Vt - Vt-1 = -0.004 + et
Malta M1 velocity	Vt= -0.461 -0.278Vt-1 + 0.700Vt-2 + 1.265et-1+et
Mexico M1 velocity	Vt- Vt-1= -0.017 -0.961Vt-1 + 1.101et-1+et
New Zealand M1 velocity	Vt - Vt-1 = -1.017Vt-1 + 1.231et-1 +et
Norway M1 velocity	Vt - Vt-1 = -0.977Vt-1 + 0.941et-1 +et
Peru M1 velocity	Vt - Vt-1 = -0.802Vt-1 + 0.049Vt-2 + 0.820et-1+et
Philippines M1 velocity	Vt - Vt-1 = -0.873Vt-1 + 0.132Vt-2 + 1.084et-1+et
Poland M1 velocity	Vt= -0.146 Vt-1 + 1.035Vt-2 + 1.151et-1+et
Portugal M1 velocity	Vt - Vt-1 = -0.242Vt-1 -0.290Vt-2+et
Russia M1 velocity	Vt - Vt-1 =-0.264Vt-1 +et
South Africa M1 velocity	Vt - Vt-1 = et
Spain M1 velocity	Vt - Vt-1 = -0.999Vt-1 + 0.888et-1 +et
Switzerland M1 velocity	Vt - Vt-1 = 0.006Vt-1 +0.309Vt-2+et
Thailand M1 velocity	Vt - Vt-1 = -1.066Vt-1 -0.242Vt-2 + 1.267et-1+et
Turkey M1 velocity	Vt= 2.110+0.867Vt-1 +0.077Vt-2 -1.230et-1+et
UK M1 velocity	Vt - Vt-1 = 0.400Vt-1 +0.279Vt-2 -0.969et-1+et
US M1 velocity	Vt - Vt-1 = 0.835Vt-1 -0.519et-1 +et

Table 2.7: The ARIMA model the M1 income velocity of money of different Countries.

Country	Equation
Brazil M2 velocity	Vt= 1.135Vt-1- 0.383Vt-2 -1.278et-1+et
France M2 velocity	Vt - Vt-1 = 0.734Vt-1 - 0.399et-1 +et
Germany M2 velocity	Vt - Vt-1 = 0.248Vt-1 +et
Hungary M2 velocity	Vt - Vt-1 = 0.002 -1.377 et-1+et
Indonesia M2 velocity	Vt= -0.827 +0.923Vt-1 -0.037Vt-2 -1.293et-1+et
Mexico M2velocity	Vt= -6.032 -0.026Vt-1 + 0.926Vt-2 + 1.103et-1+et
Netherlands M2 velocity	Vt= -1.031+1.912Vt-1 -0.917Vt-2 -1.091et-1+et
New Zealand M2 velocity	Vt - Vt-1 = et
Portugal M2 velocity	Vt - Vt-1 = et
Spain M2 velocity	Vt - Vt-1 = -1.006Vt-1 -0.003Vt-2 + 0.929et-1+et
US M2 velocity	Vt - Vt-1 = 0.319 et-1+et

Table 2.8: The ARIMA model the M2 income velocity of money of different countries.

Country	Equation
Brazil M3 velocity	Vt= -0.487 + 1.448Vt-1 -0.561Vt-2 -1.203et-1+et
France M3 velocity	Vt - Vt-1 = 0.393Vt-1 +et
Germany M3 velocity	Vt - Vt-1 = -0.003 + 0.072Vt-1 -0.336Vt-2+et
Hungary M3 velocity	Vt - Vt-1 = 0.0008 -1.367 et-1+et
Mexico M3velocity	Vt- Vt-1= -0.006 -0.958Vt-1 + 1.092et-1+et
New Zealand M3 velocity	Vt - Vt-1 = et
Spain M3 velocity	Vt - Vt-1 = -0.994Vt-1 + 1.065et-1 +et
US M3 velocity	Vt - Vt-1 =0.408Vt-1 +et

Table 2.9: The ARIMA model the M3 income velocity of money of different countries.

Country	Equation
Brazil M4 velocity	Vt= -0.697 + 1.091Vt-1 - 0.272Vt-2 -0.591et-1+et
France M4 velocity	Vt - Vt-1 = 0.393Vt-1 +et
Hungary M4 velocity	Vt= -0.910 -0.092Vt-1 +0.938Vt-2 +1.254et-1+et
Mexico M4velocity	Vt= -6.073 -0.050Vt-1 + 0.929Vt-2 + 1.094et-1+et

Table 2.10: The ARIMA model the M4 income velocity of money of different countries.

Country	Equation
Germany M3extended velocity	Vt - Vt-1 = -0.005 + 0.041Vt-1-0.412Vt-2+et
Indonesia baseM velocity	Vt - Vt-1 = -0.007 -1.330 et-1+et
Mexico M4 foreign currency velocity	Vt - Vt-1 = et
Mexico M4 national currency velocity	Vt= 0.036Vt-1 + 0.969Vt-2 + 1.110et-1+et
New Zealand M3 board velocity	Vt - Vt-1 = et
Spain boardmoney velocity	Vt - Vt-1 = -0.994Vt-1 + 1.067et-1 +et
Sweden boardmoney velocity	Vt - Vt-1 = -0.990Vt-1 + 0.771et-1 +et

Table 2.11: The ARIMA model the income velocity of money(other than M1-M4) of different countries.

General equation: $\triangle Y_{t=} a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Belgium	0.484438204		-0.390963088			Random walk with drift
M1 velocity	(4.23803)**		(-4.24201)**			
Brazil M1			-0.130490795			Random walk
velocity			(-3.18758)*			
Canada M1	0.149080787	-0.000371284	-0.018040923	-0.071853064	0.248497601	Random walk with drift and time
velocity	(1.33967)	(-0.92050)	(-1.26097)	(-0.97742)	(3.38614)**	trend
China M1	0.402487323		-0.924965111			Random walk with drift
velocity	(2.88268)**		(-2.94444)**			
Denmark	0.234868635		-0.273410351			Random walk with drift
M1 velocity	(3.09172)**		(-3.14675)**			
Finland M1	3.1281	-2.4164	-0.0755			Random walk with drift and time
velocity	(2.13491)*	(-2.21819)*	(-2.19584)*			trend
France M1	0.0020836084					Random walk
velocity	(2.23492)*					
Germany	0.070141942	-0.000220985	-0.037548812	0.118677542		Random walk with drift and time
M1 velocity	(1.80689)	(-2.48792)*	(-1.69012)	(1.45817)		trend
Hong Kong	0.924502730	-0.012291212	-0.433042556			Random walk with drift and time
M1 velocity	(2.49684)*	(-2.48187)*	(-2.46693)*			trend
Hungary	0.769941373	-0.002071597	-0.532774355			Random walk with drift and time
M1 velocity	(3.17219)**	(-2.07763)*	(-3.12958)**			trend

Indonesia	1.587591262		-0.679203942		Random walk with drift
M1 velocity	(3.47825)**		(-3.50164)**		
Iran	0.454773600	0.007639335	-0.532436357		Random walk with drift and time
M1velocity	(3.86195)**	(2.92125)**	(-4.06471)**		trend
Israel	0.137358903		-0.028040218		Random walk with drift
M1velocity	(1.50491)		(-1.50320)		
Japan M1		-0.000237656	0.001998420		Random walk with Trend
velocity		(-2.26571)*	(0.63560)		
Korea M1	2.918870600	0.003473864	-1.123427902		Random walk with drift and time
velocity	(12.83868)**	(2.95117)**	(-14.74568)**		trend
Macau M1	3.442370650	-0.059924237	-1.271001833	0.780376022	Random walk with drift and time
velocity	(5.06101)**	(-3.69535)**	(-5.13090)**	(3.80482)**	trend
Malaysia	0.163238214		-0.158812893		Random walk with drift
M1 velocity	(2.03991)*		(-2.11158)*		
Malta M1	0.223540990		-0.358841803		Random walk with drift
velocity	(3.45009)**		(-3.43185)**		
Mexico M1	0.003225036	-0.000033059	-0.151623441		Random walk with drift and time
velocity	(2.31656)*	(-2.03854)*	(-2.42499)*		trend
New	0.762695889	-0.007100250	-0.311122737		Random walk with drift and time
Zealand M1	(2.79752)**	(-2.62401)*	(-2.77034)**		trend
velocity					

Norway M1 velocity	0.068868164 (1.93152)	-0.000316014 (-1.92314)	-0.039599956 (-1.90595)	Random walk with drift and time trend
Peru M1 velocity	0.649470403 (2.61209)*	-0.005983363 (-1.97514)	-0.112986576 (-2.37761)*	Random walk with drift and time trend
Philippines M1 velocity	2.939148399 (7.26673)**	-0.016217382 (-5.77432)**	-0.672852264 (-7.75467)**	Random walk with drift and time trend
Poland M1 velocity	0.98072954 (2.86474)**		-0.473123332 (-2.97024)**	Random walk with drift
Portugal M1 velocity	0.141038644 (2.73512)**		-0.136135116 (-2.71207)**	Random walk with drift
Russia M1 velocity	1.386632382 (2.91093)**	-0.013140351 (-2.19175)*	-0.437437064 (-3.08238)**	Random walk with drift and time trend
South Africa M1 velocity	0.291770387 (1.88660)	-0.001478571 (-2.28394)*	-0.033401065 (-1.67413)	Random walk with drift and time trend
Spain M1 velocity	0.116212486 (2.57866)*		-0.117263157 (-2.60983)*	Random walk with drift
Switzerland M1 velocity		-0.000175896 (-1.87653)	0.010357901 (1.34334)	Random walk with Trend
Thailand M1 velocity	0.182940727 (1.21584)		-0.081841892 (-1.40792)	Random walk with drift

Turkey M1	4.761029264	0.110950521	-1.489041937	Random walk with drift and time
velocity	(8.20663)**	(7.28660)**	(-10.11641)**	trend
UK M1	0.015637319		-0.810451325	Random walk with drift
velocity	(4.87471)**		(-7.33583)**	
US M1		0.0042997211		Random walk
velocity		(3.59693)**		

Table 2.12: Unit Root of M1 velocity

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

General equation: $\triangle Y_{t=} a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Brazil M2 velocity			-0.081138396 (-2.35943)**			Random walk
France M2 velocity		-0.000061787 (-1.98895)*	0.007089230 (2.58701)*			Random walk with Trend
Germany M2 velocity	0.103247815 (2.61699)*	-0.000329891 (-2.56334)*	-0.099094523 (-2.68026)**	0.206680001 (2.25561)*		Random walk with drift and time trend
Hungary M2 velocity	0.633266408 (5.58444)**		-1.027792036 (-5.58450)**			Random walk with drift
Indonesia M2 velocity		0.001101387 (2.10181)*	-0.050726210 (-2.71143)*	-0.634792488 (-3.99968)**		Random walk with Trend
Italy M2 velocity	0.162396585 (5.78862)**	0.001459162 (5.53581)**	-0.529834721 (-5.78035)**			Random walk with drift and time trend
Mexico M2 velocity	1.1065 (3.46560)**	-6.0764 (-3.28984)**	-0.3192 (-3.55436)**			Random walk with drift and time trend
Netherlands M2 velocity			-0.012440393 (-1.60073)			Random walk

New Zealand M2 velocity	0.496840534 (3.85415)**	-0.002843867 (-3.23394)**	-0.635817417 (-3.92375)**		Random walk with drift and time trend
Portugal M2 velocity	0.021565207 (1.62204)		-0.060003376 (-1.60366)		Random walk with drift
Spain M2 velocity	0.037963510 (2.05076)*		-0.066238641 (-2.03844)*		Random walk with drift
US M2 velocity	0.055802529 (2.20092)*	0.000080410 (1.73932)	-0.035328095 (-2.20173)*	0.390106952 (5.53505)**	Random walk with drift and time trend

Table 2.13:Unit Root of M2 velocity

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

General equation: $\triangle Y_t = a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Brazil M3 velocity			-0.107833269 (-2.85658)**			Random walk
France M3 velocity	0.012148180 (1.42679)		-0.032802911 (-1.41993)	0.323754012 (2.89683)*	0.125785780 (1.12089)	Random walk with drift
Germany M3 velocity	0.117778202 (3.60053)**	-0.000315445 (-3.65263)**	-0.193655127 (-3.61934)**			Random walk with drift and time trend
Hungary M3 velocity	0.639507678 (5.55258)**	-0.001000428 (-2.19233)*	-1.053624901 (-5.57239)**			Random walk with drift and time trend
Mexico M3 velocity	5.7054 (2.44973)*	-3.0700 (-2.12707)*	-0.1760 (-2.60421)*			Random walk with drift and time trend
New Zealand M3 velocity			-0.007808168 (-2.19649)*	-0.289771667 (-1.72343)		Random walk
Spain M3 velocity	0.060755034 (3.71412)**	-0.000072868 (-2.33183)*	-0.191824213 (-3.85779)**			Random walk with drift and time trend
US M3 velocity		-0.001785705 (-2.07721)*				Random walk

Table 2.14: Unit Root of M3 velocity

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

General equation: $\triangle Y_{t=} a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Brazil M4 velocity			-0.110581472			Random walk
			(-2.93830)			
France M4 velocity	0.012148180		-0.032802911	0.323754012	0.125785780	Random walk with drift
	(1.42679)		(-1.41993)	(2.89683)*	(1.12089)	
Hungary M4 velocity	0.504261224	-0.003016011	-1.064935670			Random walk with drift and time trend
	(5.49515)**	(-4.61113)**	(-5.56780)**			
Mexico M4 velocity			-0.037030091			Random walk
			(-2.25821)*			

Table 2.15: Unit Root of M4 velocity

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

General equation: $\triangle Y_{t=} a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Germany M3extended velocity	0.173839723	-0.000633766	-0.308754261			Random walk with drift and time trend
	(4.16148)**	(-4.11818)**	(-4.22377)**			
Indonesia baseM velocity	4.651328465	-0.062835039	-0.994554871			Random walk with drift and time trend
	(4.74075)**	(-4.14342)**	(-4.85550)**			
Mexico M4 foreign currency velocity			-0.037030091			Random walk
			(-2.25821)*			
Mexico M4 national currency velocity	7.0326	-3.9337	-0.2034			Random walk with drift and time trend
	(2.63959)*	(-2.36870)*	(-2.76455)**			
New Zealand M3 board velocity	0.081820365	-0.000487135	-0.217791787			Random walk with drift and time trend
	(2.61707)*	(-2.50092)*	(-2.70553)**			
Spain boardmoney velocity	0.048070305	-0.000099951	-0.150828109			Random walk with drift and time trend
	(3.05657)**	(-2.34132)*	(-3.21616)**			
Sweden boardmoney velocity	0.180159756	0.000587030	-0.371965340			Random walk with drift and time trend
	(4.25163)**	(2.86597)**	(-4.18377)**			

Table 2.16: Unit Root of income velocity of money (other than M1-M4)

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

	Number of series	Number of stochastic trend	Number of deterministic trend	Positive Trend	Negative Trend
M1	33	14 (42.42%)	19 (57.58%)	4	15
M2	12	5 (41.67%)	7 (58.33%)	3	4
M3	8	3 (37.5%)	5 (62.5%)	0	5
M4	4	3 (75%)	1 (25%)	0	1
Other than M1-M4	7	1 (14.29%)	6 (85.71%)	0	4
Overall	64	26 (40.63%)	38 (59.37%)	7 (30.43%)	26 (69.57%)

Table 2.17: overall statistics of velocity

Not participating in euro with positive trend	Not participating in euro with negative trend	Not participating in euro with no trend	Participating in euro with positive trend	Participating in euro with negative trend	Participating in euro with no trend
Turkey M1	Finland M1	Denmark M1	Italy M2	Germany M1	Belgium M1
Sweden boardmoney	Hungary M1	Malta M1		Norway M1	France M1
	Russia M1	Poland M1		France M2	Portugal M1
	Switzerland M1	UK M1		Germany M2	Spain M1
	Hungary M3	Hungary M2		Germany M3	Netherlands M2
	Hungary M4			Spain M3	Portugal M2
				Germany M3extended	Spain M2
				Spain boardmoney	France M3
					France M4

Table 2.18: Distribution of the income velocity of money sort by euro zone and non euro zone

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Belgium M1 velocity	1.236426	0.007396	0.086	0.069555317
Brazil M1 velocity	8.367357	66.80197	8.173247	0.976801562
Canada M1 velocity	6.870089	2.241418	1.497137	0.217920976
China M1 velocity	0.435664	0.003859	0.062121	0.142589
Denmark M1 velocity	0.870454	0.003868	0.062193	0.071449241
Finland M1 velocity	0.002526	1.131208	1.063583	421.0424196
France M1 velocity	1.049466	0.010115	0.100573	0.095832888
Germany M1 velocity	1.479544	0.033784	0.183804	0.124230352
Hong Kong M1 velocity	1.784428	0.044803	0.211667	0.118619057
Hungary M1 velocity	1.381064	0.003216	0.05671	0.041062394
Indonesia M1 velocity	2.341995	0.024577	0.156771	0.066938872
Iran M1 velocity	1.188626	0.082213	0.286728	0.241226515
Israel M1 velocity	4.351837	4.949537	2.224755	0.511222211
Japan M1 velocity	3.520284	0.420729	0.648636	0.184256796
Korea M1 velocity	2.862505	0.589285	0.767649	0.268173853
Macau M1 velocity	2.336089	0.051515	0.226969	0.09715775
Malaysia M1 velocity	1.055021	0.016925	0.130096	0.123311426
Malta M1 velocity	0.615776	0.003419	0.058472	0.094956984
Mexico M1 velocity	0.014032	2.704326	1.644484	117.1914244
New Zealand M1 velocity	2.028647	0.065223	0.255388	0.125890775
Norway M1 velocity	1.161272	0.149347	0.386454	0.332785558
Peru M1 velocity	3.678598	1.829968	1.352763	0.367738776
Philippines M1 velocity	3.321147	0.70477	0.839506	0.252775829
Poland M1 velocity	2.122647	0.052256	0.228596	0.107693727
Portugal M1 velocity	1.017149	0.016937	0.130142	0.127948084
Russia M1 velocity	2.656841	0.203046	0.450606	0.169602241
South Africa M1 velocity	5.909497	1.94592	1.394962	0.236054344
Spain M1 velocity	0.995901	0.012494	0.111777	0.112236565
Switzerland M1 velocity	0.794263	0.020173	0.142032	0.178822
Thailand M1 velocity	2.540949	0.195131	0.441736	0.173846996
Turkey M1 velocity	5.137204	2.773767	1.665463	0.324196361
UK M1 velocity	0.019218	0.000471	0.021703	1.129307408
US M1 velocity	6.173357	2.081609	1.442778	0.233710475

Table 2.19a: Summary of M1 Velocity General Statistics

Country M1 Velocity	Mean	Varience	Standard Deviation	Coefficient of variation
Belgium	1.278522	0.006177	0.078593893	0.06147246
Canada	6.205813	0.558351	0.747228881	0.120407895
Finland	0.001014	3.347524	1.829624005	1804.362924
France	1.154072	0.002228	0.047201695	0.04090013
Germany	1.20323	0.014477	0.120320406	0.099997844
Hanguary	1.402641	0.003014	0.054899909	0.039140385
Japan	3.284395	0.303936	0.551303909	0.167855544
Korea	3.07557	0.158133	0.397659402	0.129296164
Malaysia	1.043571	0.020649	0.143697599	0.137697961
Mexico	0.012095	1.01E-05	0.00317805	0.262757314
New Zealand	2.16898	0.039691	0.199226002	0.091852393
Peru	4.224071	1.526627	1.235567481	0.292506324
Philippines	2.911874	0.153093	0.391271006	0.134370857
Portugal	1.082568	0.008145	0.090249654	0.083366268
Spain	0.983263	0.002634	0.05132251	0.052196116
Switerland	0.892234	0.027902	0.167038918	0.187214248
Thailand	2.785174	0.083187	0.288421566	0.103556031
Turkey	5.581706	2.633098	1.622682347	0.290714407
UK	0.025143	0.000861	0.029342802	1.167036611
US	7.067175	0.611219	0.781804963	0.11062482

Table 2.19b: 90's Country's Income Velocity of Money Statistics Summary

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Brazil M2 velocity	1.138479	0.26592	0.515674	0.45295
France M2 velocity	0.561677	0.003621	0.060175	0.107134
Germany M2 velocity	0.859331	0.014414	0.120058	0.139711
Hungary M2 velocity	0.615678	0.000363	0.019053	0.030946
Indonesia M2 velocity	0.487046	0.001923	0.043852	0.090037
Italy M2 velocity	0.439961	0.006451	0.080318	0.182557
Mexico M2velocity	0.002841	1.766413	1.329065	467.7644
Netherlands M2 velocity	0.493213	0.039048	0.197606	0.40065
New Zealand M2 velocity	0.699625	0.003311	0.057541	0.082246
Portugal M2 velocity	0.353594	0.001152	0.033941	0.095989
Spain M2 velocity	0.565608	0.004521	0.067238	0.118878
US M2 velocity	1.777806	0.021189	0.145564	0.081879

Table 2.20: Summary of M2 Velocity General Statistics

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Brazil M3 velocity	0.797964	0.25978	0.509686	0.638733
France M3 velocity	0.368517	0.000318	0.017833	0.04839
Germany M3 velocity	0.515353	0.003166	0.056267	0.109182
Hungary M3 velocity	0.59105	0.000467	0.02161	0.036562
Mexico M3velocity	0.002734	1.880212	1.371208	501.5638
New Zealand M3 velocity	0.33578	0.000426	0.02064	0.061468
Spain M3 velocity	0.297773	0.000436	0.020881	0.070123
US M3 velocity	1.486351	0.013447	0.115961	0.078017

Table 2.21: Summary of M3 Velocity General Statistics

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Brazil M4 velocity	0.675301	0.192837	0.439132	0.650276
France M4 velocity	0.368517	0.000318	0.017833	0.04839
Hungary M4 velocity	0.426962	0.000962	0.031016	0.072644
Mexico M4velocity	0.032827	0.000201	0.014177	0.431888

Table 2.22: Summary of M4 Velocity General Statistics

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Germany M3extended velocity	0.464457	0.003734	0.061106	0.131565
Indonesia baseM velocity	3.76048	0.353248	0.594347	0.158051
Mexico M4 foreign currency velocity	0.032827	0.000201	0.014177	0.431888
Mexico M4 national currency velocity	0.002865	2.103749	1.450431	506.3303
New Zealand M3 board velocity	0.311066	0.002011	0.044844	0.144163
Spain boardmoney velocity	0.285429	0.000919	0.030315	0.106209
Sweden boardmoney velocity	0.551431	0.003271	0.057193	0.103717

Table 2.23: Summary of Velocity(other than M1-M4) General Statistics

	No. of series	Average Mean	Average Variance	Average Standard Deviation
M1	33	2.403633	2.702281	0.803197
M2	12	0.666238	0.177361	0.222507
M3	7	0.585393	0.308259	0.301886
M4	4	0.375902	0.04858	0.12554
(other than M1-M4)	7	0.772651	0.352448	0.321773

Table 2.24: Velocity(sort by M) Statistics Summary

General equation: $\Delta V_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt\ 1} + \sum_{n=1}^{n} \beta_n X_{nt\ 2} + \sum_{p=1}^{p} \beta_p X_{pt\ 3} + \varepsilon_t$

Where X=f(ti , pr, ept, ii, ir, ca, ka, fa, gb)

Income Velocity of Money	Brazil	Canada	France	Germany	Hungary	Korea	Peru	Spain
ti_{t-1}	-15.95	0.17	-0.02	**0.06**	**-0.23**	-3.26	-0.0007	-0.01
	(-1.17)	(1.96)	(-0.34)	**(2.84)***	**(-2.20)***	(-1.93)	(-0.55)	(-0.36)
pr_{t-1}	274.02	**-8.16**	1.11	-0.18	**2.12**	**97.38**	0.03	1.54
	(1.29)	**(-2.27)***	(0.24)	(-0.37)	**(3.89)***	**(2.03)***	(0.46)	(1.37)
ept_{t-1}	-273.26	**8.18**	-1.09	0.12	**-2.18**	**-97.19**		-1.56
	(-1.29)	**(2.27)***	(-0.23)	(0.24)	**(-4.05)***	**(-2.02)***		(-1.40)
ii_{t-1}	0.2	**0.11**	-0.01	-0.01	-0.01	-0.68	0.02	0.06
	(0.06)	**(2.87)***	(-0.47)	(-0.67)	(-0.41)	(-1.83)	(0.22)	(0.99)
ir_{t-1}	22.02	0.60	**-2.92**	0.14	**2.29**	6.21	0.31	**-2.25**
	(0.42)	(0.70)	**(-1.97)***	(0.37)	**(5.19)***	(1.34)	(0.32)	**(-2.10)***
ca_{t-1}	-0.66	-0.00003	-0.001	**-0.001**	0.00005	**0.0001**	**0.0001**	**-0.00001**
	(-0.69)	(-0.86)	(-1.23)	**(-2.85)***	(0.23)	**(2.72)***	**(2.58)***	**(-4.56)***
ka_{t-1}	-0.38	0.00001	-0.002	0.009	0.01	0.0001	-0.0003	0.00001
	(-0.93)	(0.08)	(-0.78)	(1.42)	(1.43)	(0.10)	(-0.20)	(1.38)
fa_{t-1}	0.00001	-0.00001	-0.0002	**-0.001**	-0.00001	-0.00002	0.00005	**-0.00003**
	(0.16)	(-0.99)	(-0.36)	**(-2.99)***	(-1.55)	(-1.66)	(0.17)	**(-2.42)***
gb_{t-1}	-0.18	0.009	0.0003	-0.0001	0.14	**0.03**	-0.001	0.0004

	(-1.09)	(0.62)	(0.60)	(-0.04)	(0.85)	**(3.08)***	(-0.25)	(0.29)
ti_{t-2}	0.34	-0.15	-0.01	-0.02		**1.07**		
	(0.10)	(-1.72)	(-0.56)	(-1.08)		**(3.03)***		
pr_{t-2}	-202.62	**15.83**	-0.69			**-112.03**		
	(-1.08)	**(3.03)***	(-0.15)			**(-2.26)***		
ept_{t-2}	204.94	**-15.78**	0.69			**111.74**		
	(1.09)	**(-3.01)***	(0.15)			**(2.26)***		
ii_{t-2}	-1.67	0.02	0.04			-0.60		
	(-0.97)	(0.42)	(1.23)			(-1.82)		
ir_{t-2}	34.88	1.01	-1.46			**12.82**		
	(0.75)	(1.14)	(-1.18)			**(2.61)***		
ca_{t-2}	-0.64	-0.00003	-0.0006			-0.00001	-0.0001	**0.00001**
	(-0.59)	(-0.93)	(-0.49)			(-0.50)	(-1.76)	**(3.77)***
ka_{t-2}	-0.49	-0.00002	0.004			0.0007		
	(-0.99)	(-0.15)	(1.18)			(0.89)		
fa_{t-2}	0.0001	-0.00002	0.001			**0.00006**		
	(2.70)	(-0.98)	(1.43)			**(3.47)***		
gb_{t-2}	-0.01	0.01	0.001			-0.01		
	(-0.04)	(0.93)	(1.53)			(-1.12)		
ti_{t-3}	-4.36					0.07		
	(-2.86)					(0.22)		
pr_{t-3}	**-1.79**	**-7.82**						
	(-0.98)*	**(-2.21)***						

ept_{t-3}		7.84						
		(2.22)*						
ii_{t-3}						0.33		
						(0.99)		
ir_{t-3}								
ca_{t-3}								
ka_{t-3}								
fa_{t-3}								
gb_{t-3}		-0.01	0.001					
		(-1.05)	(1.37)					
Constant	-1.03	-0.01	0.03	-0.004	1.24	3.26	0.008	-0.02
	(-0.55)	(-0.45)	(1.42)	(-0.56)	(55.23)*	(12.47)*	(0.15)	(-0.95)
DW	2.02	2.08	2.00	1.92	1.96	1.77	2.04	2.16

Table2.25: Income Velocity of Money regression result

General equation: $\Delta V_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt} + \varepsilon_t$

Where X=f(gdpg , pr, ir, govef, spl, trade, dev, euro)

velocity	constant	gdpg	pr	ir	govef	spl	trade	dev	euro
coefficient	-6.107	234.615	14.161	-365.164	2.281	-0.58	-0.021	5.356	-5.615
t-statistics	(-2.07)	(2.64)*	(-1.05)	(-2.92)*	(3.94)*	(-3.25)*	(-1.82)	(2.92)*	(-2.07)*

*95%significant level

R^2	0.7943
Adjusted R^2	0.6768
Ramsey test	No omitted variables
Cook-Weisberg Test	No heteroskedasticity
Prob > F	0.001

Table2.26: regression of the the 90s velocity mean with different economics variables

		V	GDPG	PR	IR	GOVEF	SPL	TRADE	DEV	EURO
V	Pearson Correlation	1	.233	.111	.224	.360	-.096	-.436(*)	-.199	-.462(*)
	Sig. (2-tailed)	.	.285	.616	.304	.092	.662	.037	.363	.026
	N	23	23	23	23	23	23	23	23	23
GDPG	Pearson Correlation	.233	1	.801(**)	.994(**)	.641(**)	-.115	-.126	-.576(**)	-.280
	Sig. (2-tailed)	.285	.	.000	.000	.001	.600	.565	.004	.196
	N	23	23	23	23	23	23	23	23	23
PR	Pearson Correlation	.111	.801(**)	1	.822(**)	.398	-.375	-.220	-.340	.025
	Sig. (2-tailed)	.616	.000	.	.000	.060	.078	.314	.113	.910
	N	23	23	23	23	23	23	23	23	23
IR	Pearson Correlation	.224	.994(**)	.822(**)	1	.628(**)	-.135	-.172	-.552(**)	-.278
	Sig. (2-tailed)	.304	.000	.000	.	.001	.540	.432	.006	.199
	N	23	23	23	23	23	23	23	23	23
GOVEF	Pearson Correlation	.360	.641(**)	.398	.628(**)	1	.247	.023	-.880(**)	-.384
	Sig. (2-tailed)	.092	.001	.060	.001	.	.255	.917	.000	.071
	N	23	23	23	23	23	23	23	23	23

SPL	Pearson Correlation	-.096	-.115	-.375	-.135	.247	1	.225	-.352	-.547(**)
	Sig. (2-tailed)	.662	.600	.078	.540	.255	.	.301	.099	.007
	N	23	23	23	23	23	23	23	23	23
TRADE	Pearson Correlation	-.436(*)	-.126	-.220	-.172	.023	.225	1	-.188	.078
	Sig. (2-tailed)	.037	.565	.314	.432	.917	.301	.	.390	.724
	N	23	23	23	23	23	23	23	23	23
DEV	Pearson Correlation	-.199	-.576(**)	-.340	-.552(**)	-.880(**)	-.352	-.188	1	.530(**)
	Sig. (2-tailed)	.363	.004	.113	.006	.000	.099	.390	.	.009
	N	23	23	23	23	23	23	23	23	23
EURO	Pearson Correlation	-.462(*)	-.280	.025	-.278	-.384	-.547(**)	.078	.530(**)	1
	Sig. (2-tailed)	.026	.196	.910	.199	.071	.007	.724	.009	.
	N	23	23	23	23	23	23	23	23	23

Table 2.27: Correlation Coefficient of the variables in the regression of the the 90s income velocity of money mean with different economics variables

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

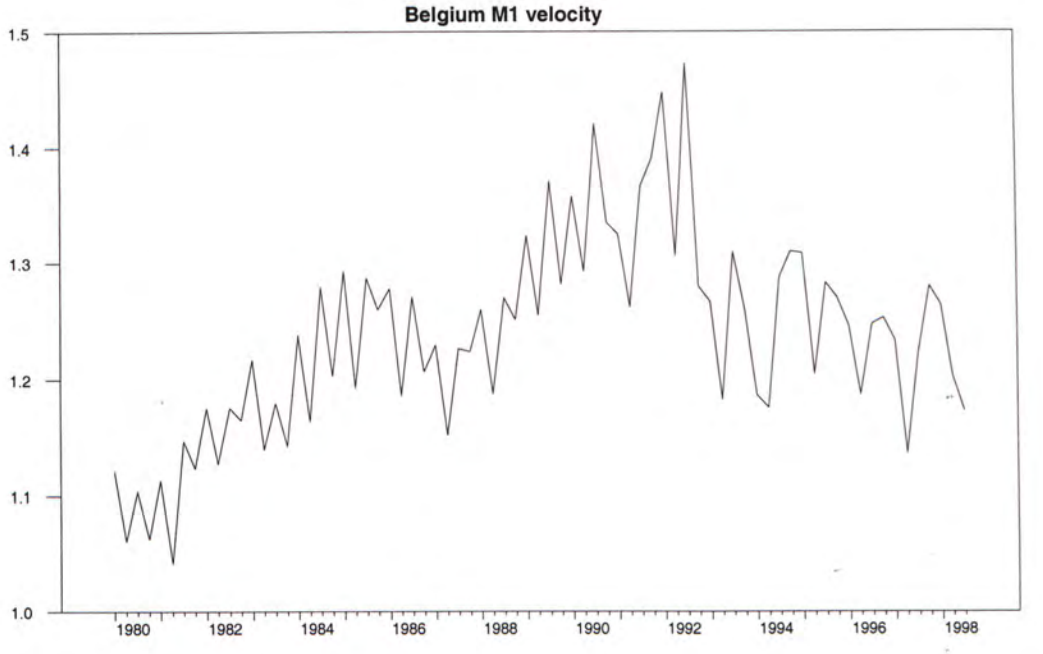


Figure 2.1a : Belgium M1 velocity

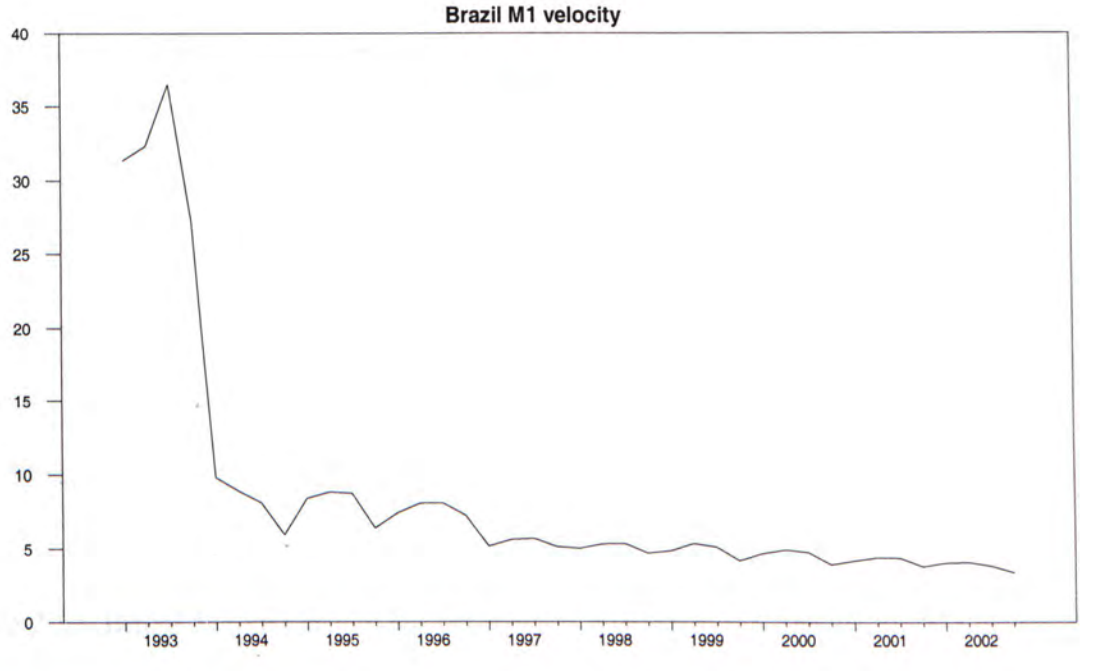


Figure 2.1b: Brazil M1 velocity

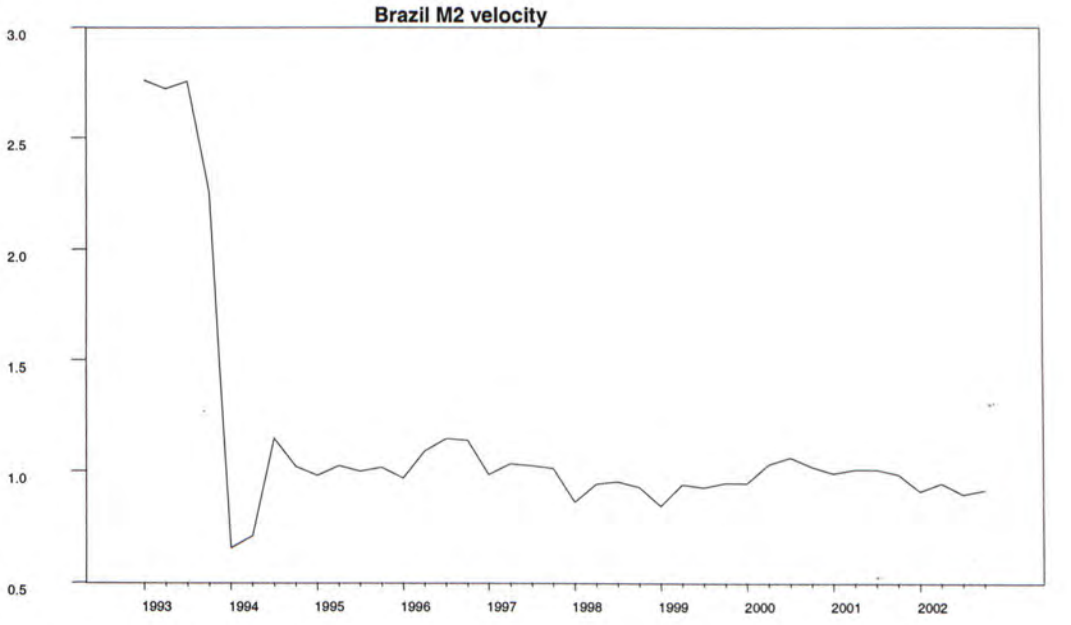


Figure 2.1c: Brazil M2 velocity

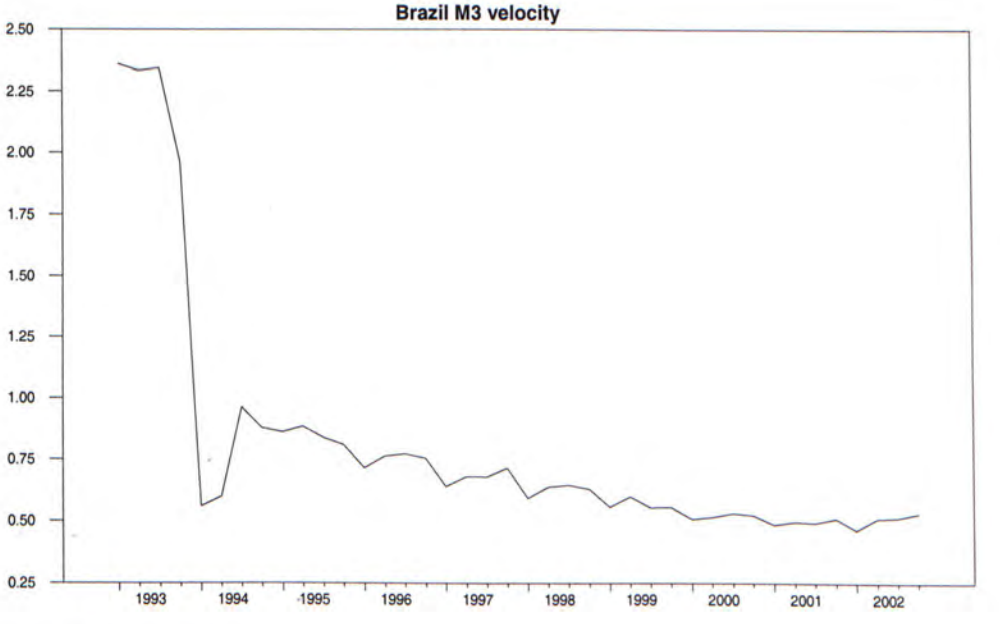


Figure 2.1d: Brazil M3 velocity

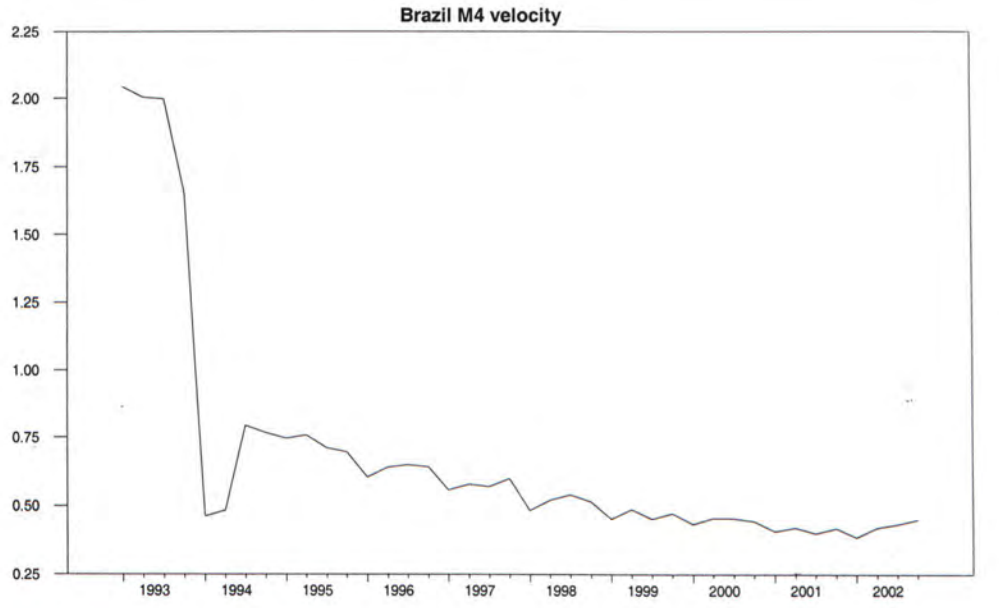


Figure 2.1e: Brazil M4 velocity

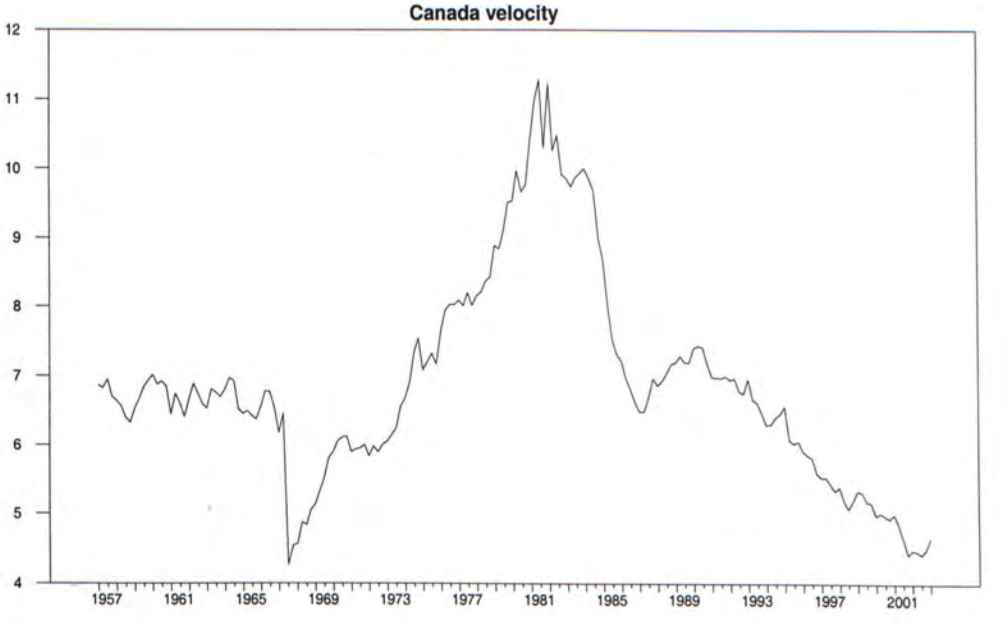


Figure 2.1f: Canada M1 velocity

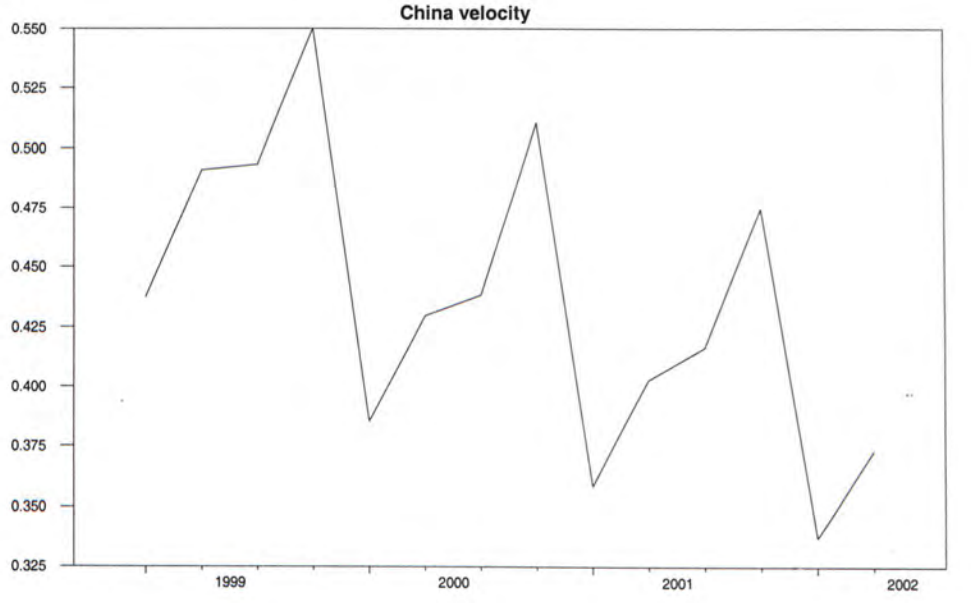


Figure 2.1g: China M1 velocity

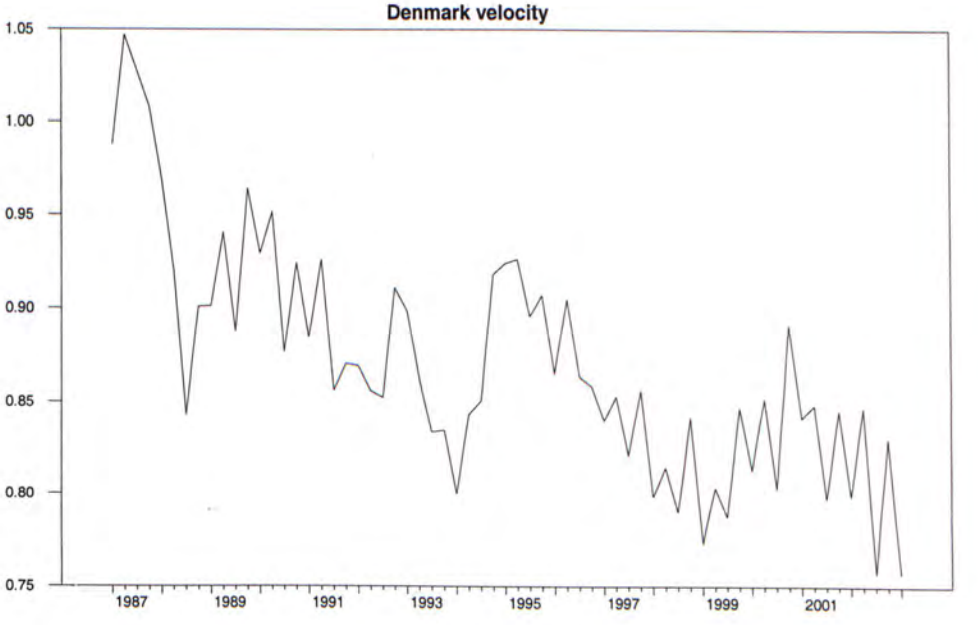


Figure 2.1h: Demark M1 velocity

Figure 2.1i: Finland M1 velocity

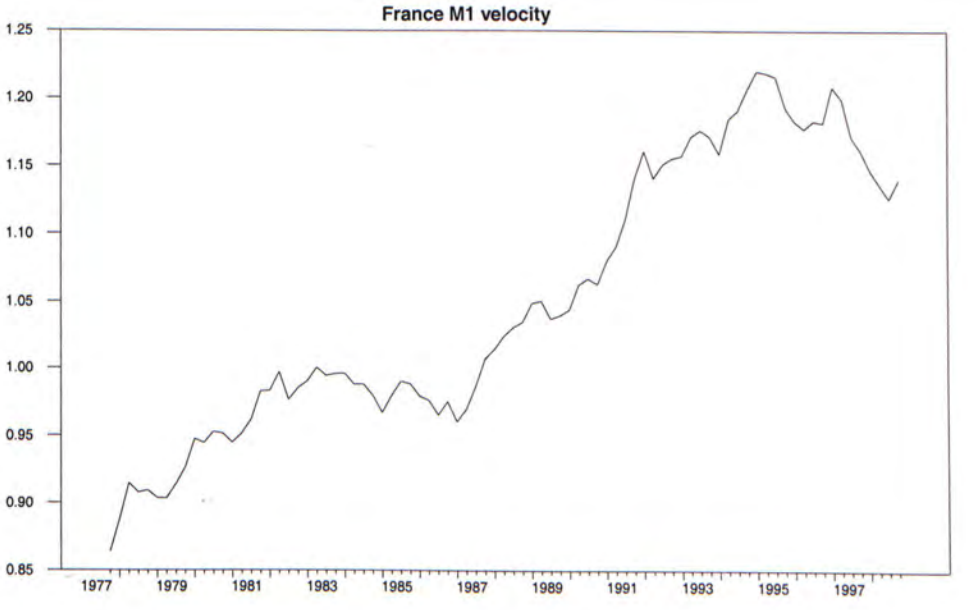


Figure 2.1j: France M1 velocity

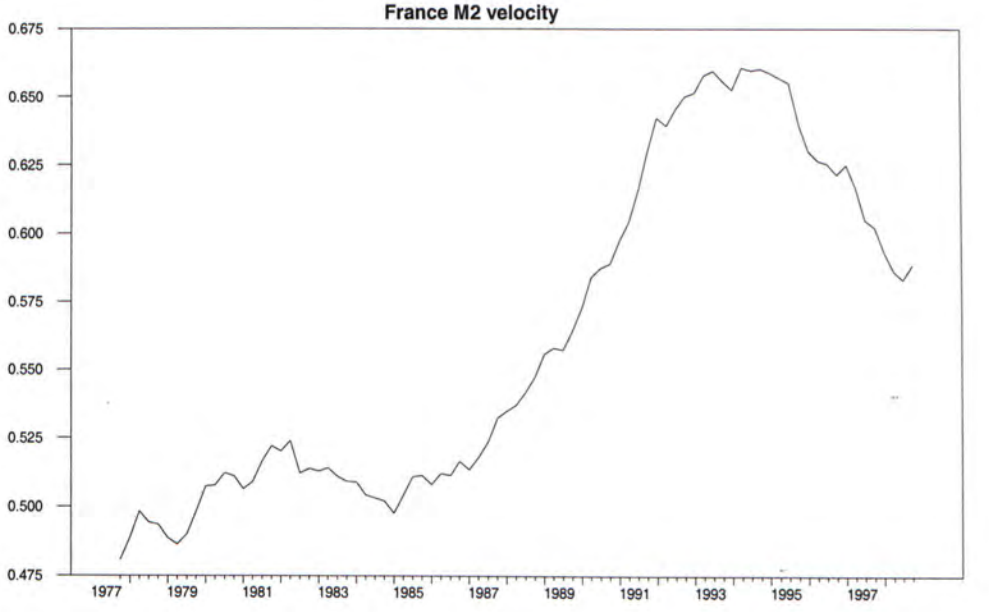


Figure 2.1k: France M2 velocity

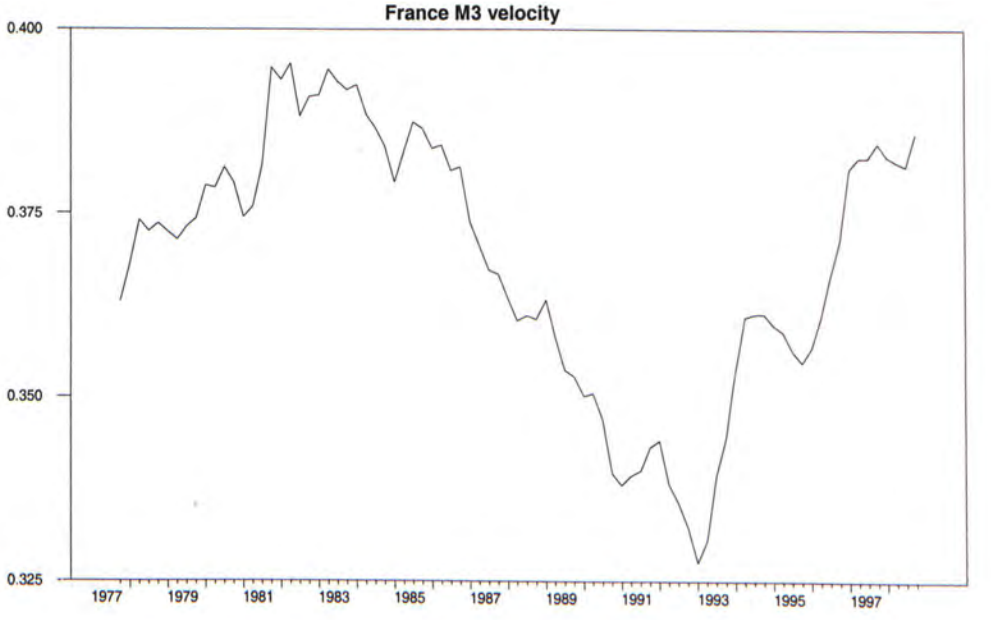


Figure 2.1l: France M3 velocity

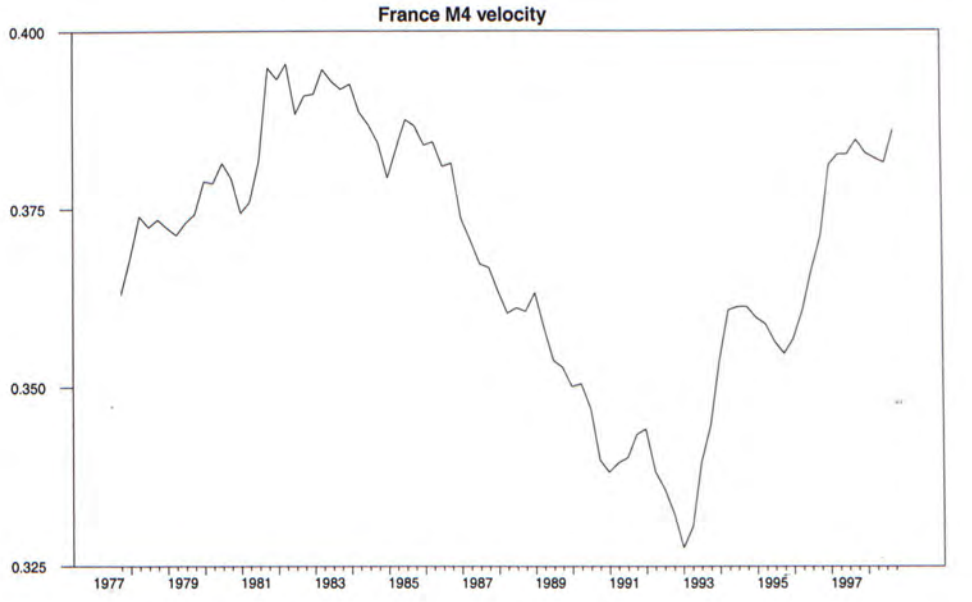


Figure 2.1m: France M4 velocity

Figure 2.1n: Germany M1 velocity

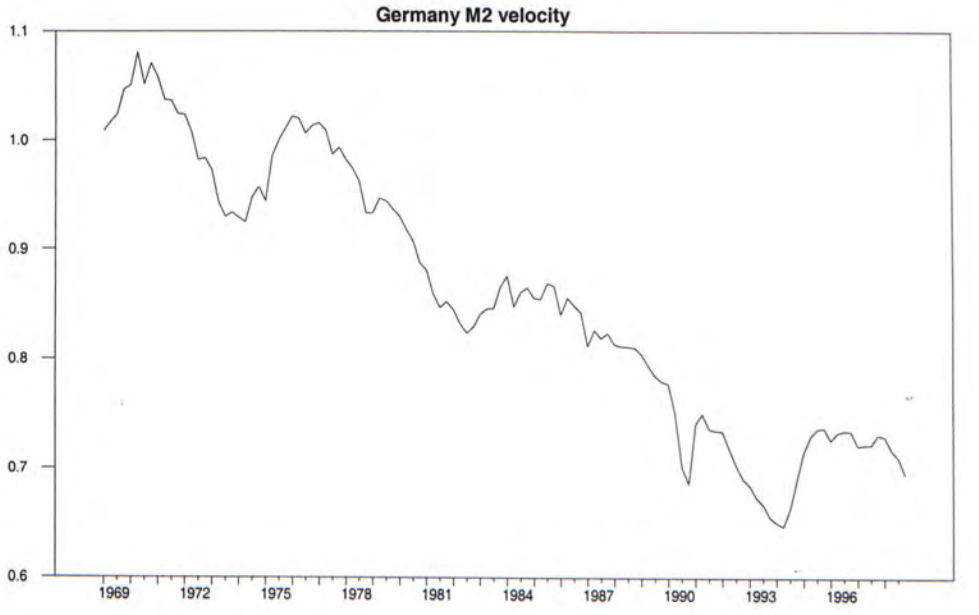


Figure 2.1o: Germany M2 velocity

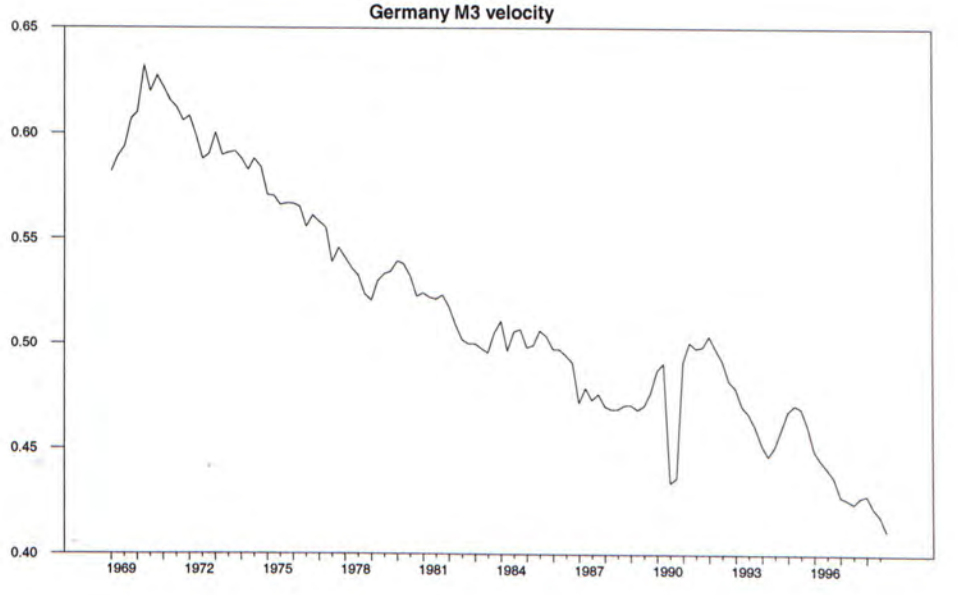


Figure 2.1p: Germany M3 velocity

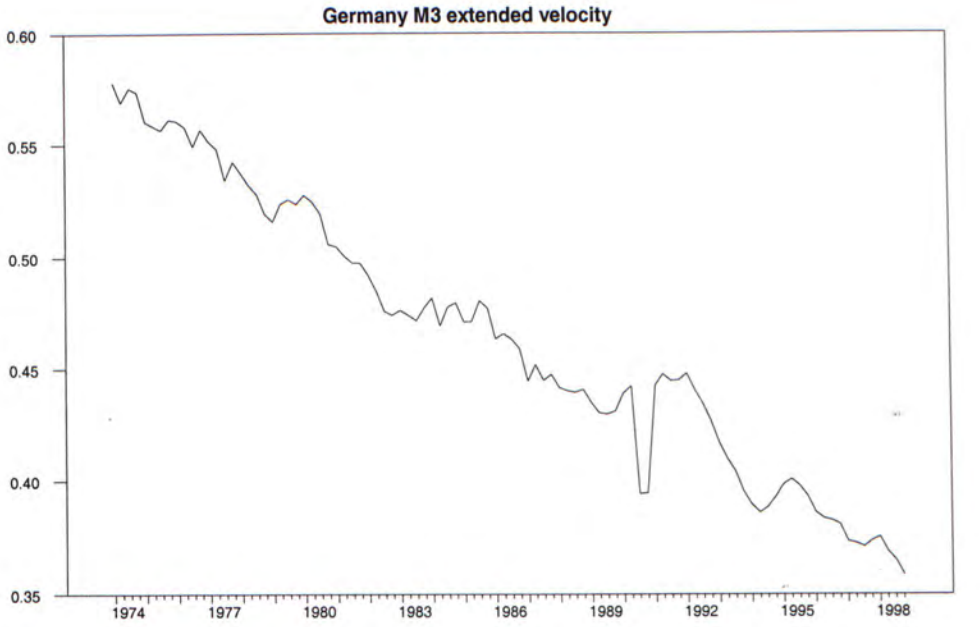


Figure 2.1q: Germany M4velocity

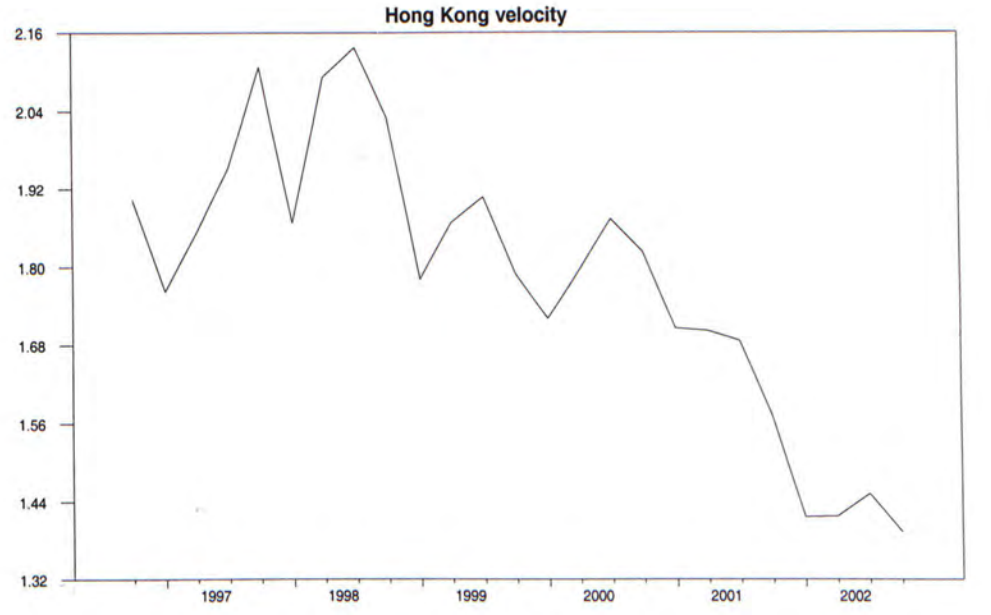


Figure 2.1r: Hong Kong M1 velocity

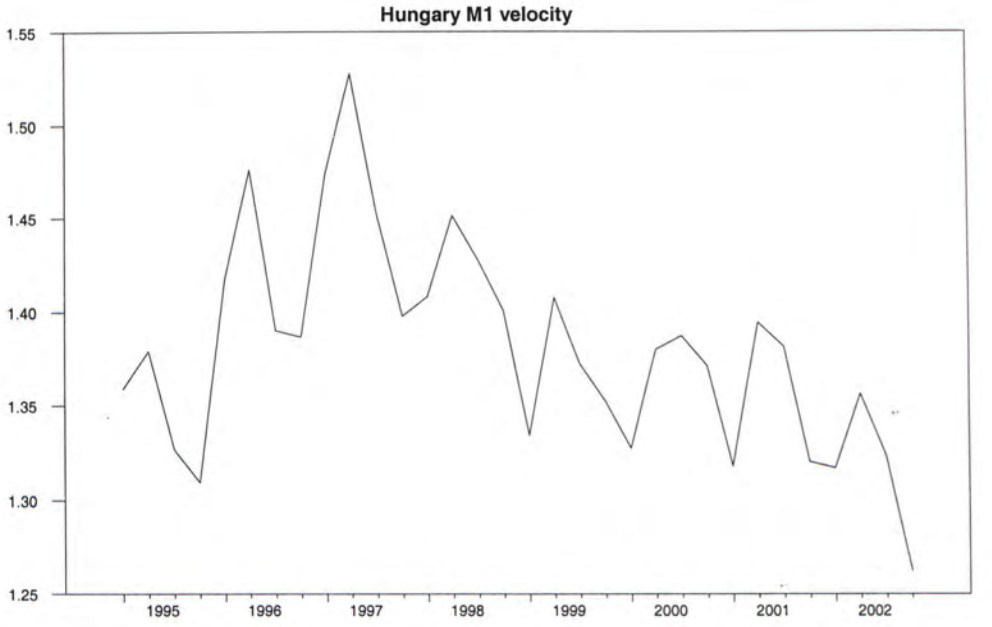


Figure 2.1s: Hungary M1 velocity

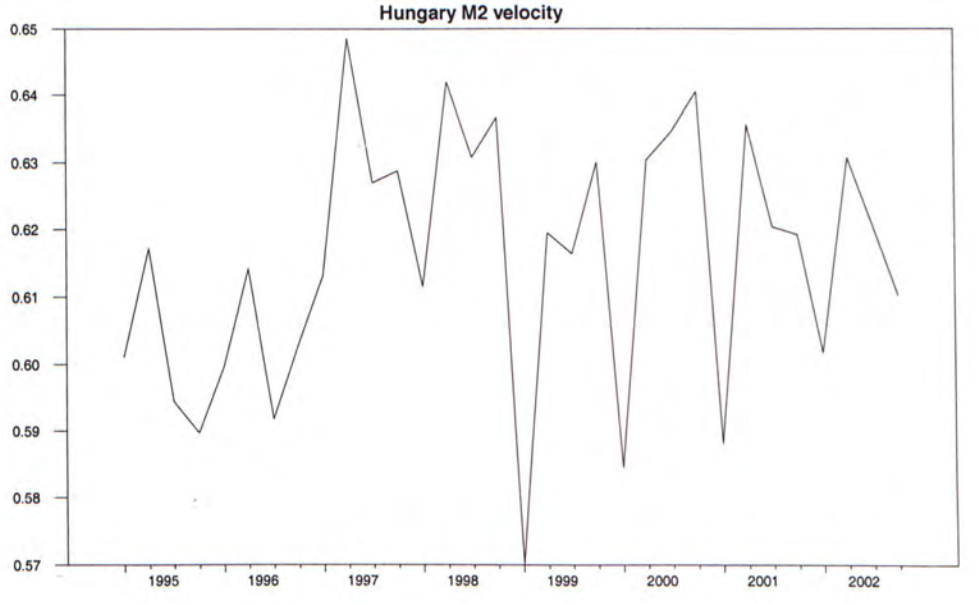


Figure 2.1t: Hungary M2 velocity

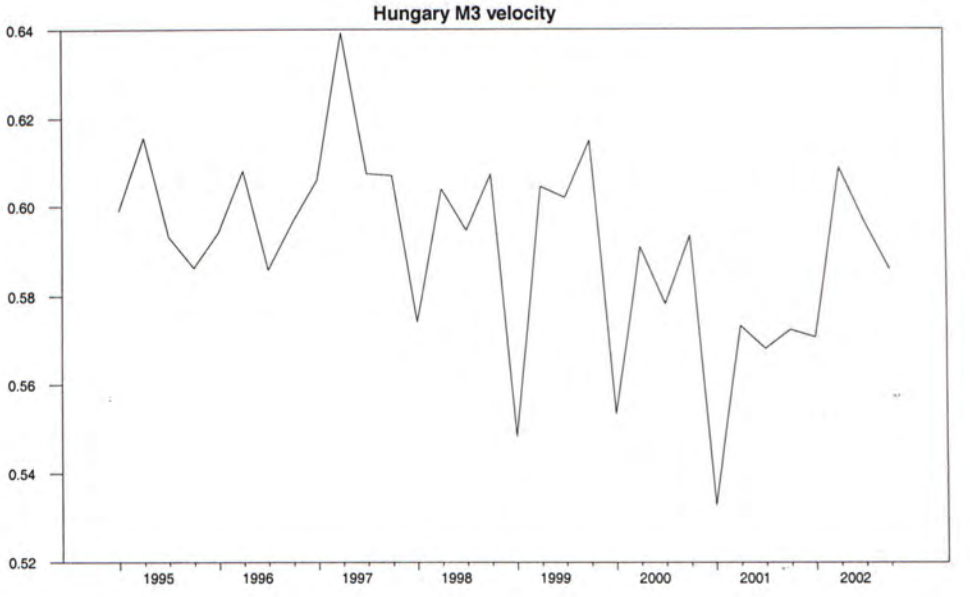


Figure 2.1u: Hungary M3 velocity

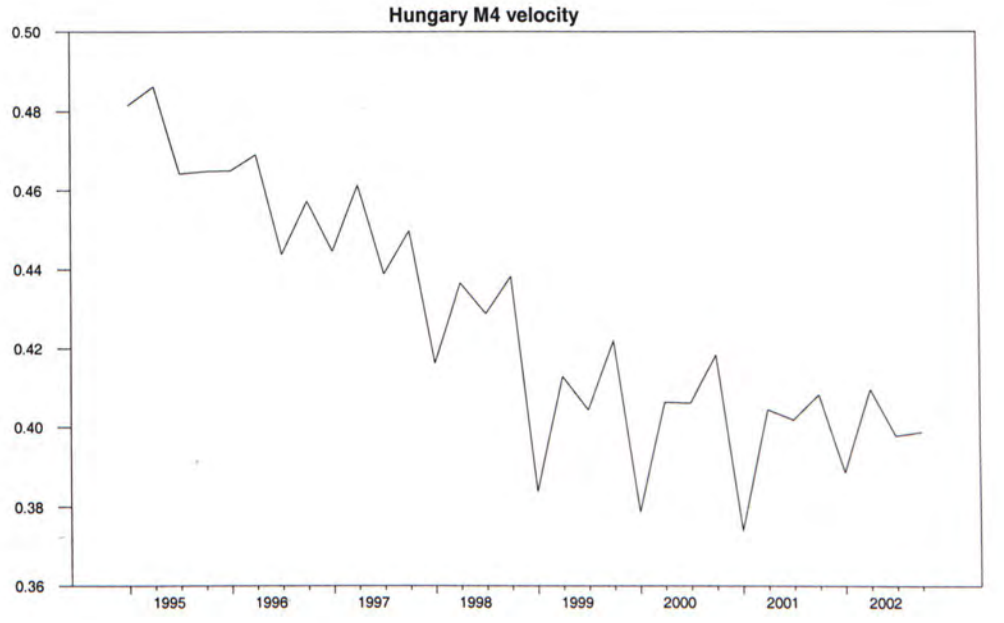


Figure 2.1v: Hungary M4 velocity

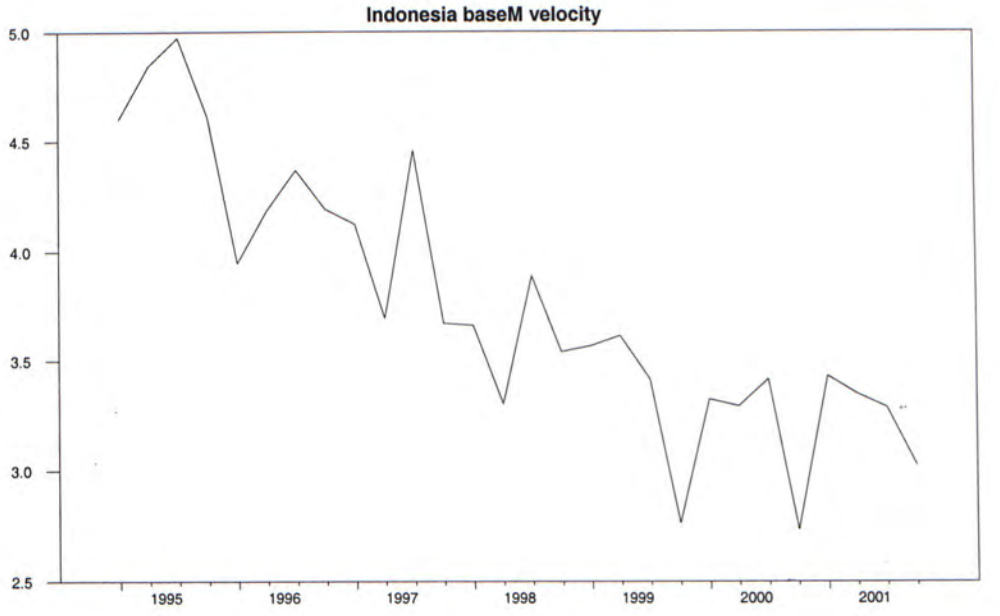


Figure 2.1w: Indonesia Base Money velocity

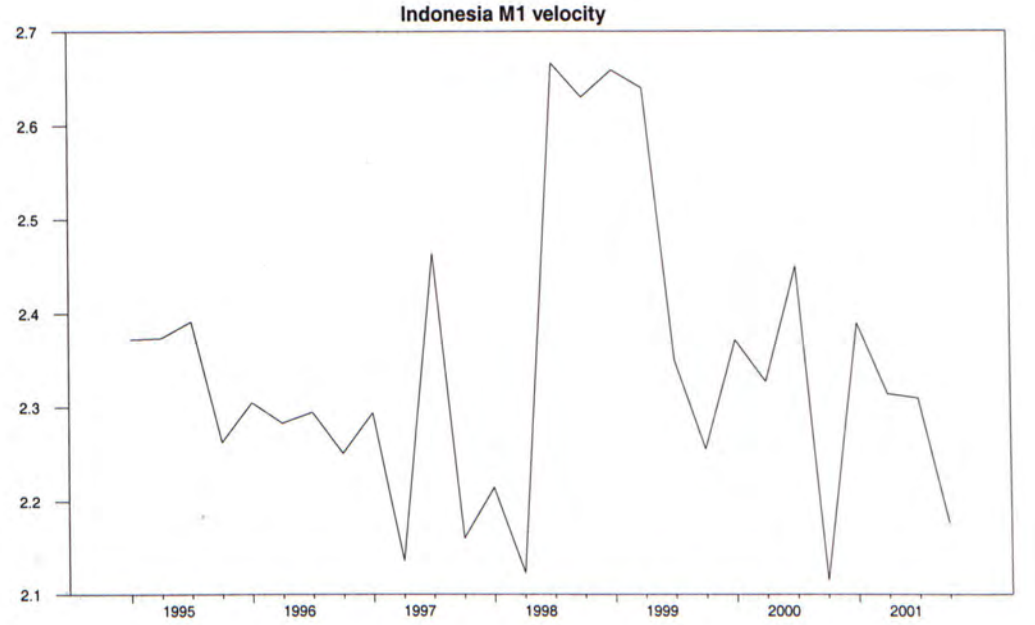


Figure 2.1x: Indonesia M1 velocity

Figure 2.1y: Indonesia M2 velocity

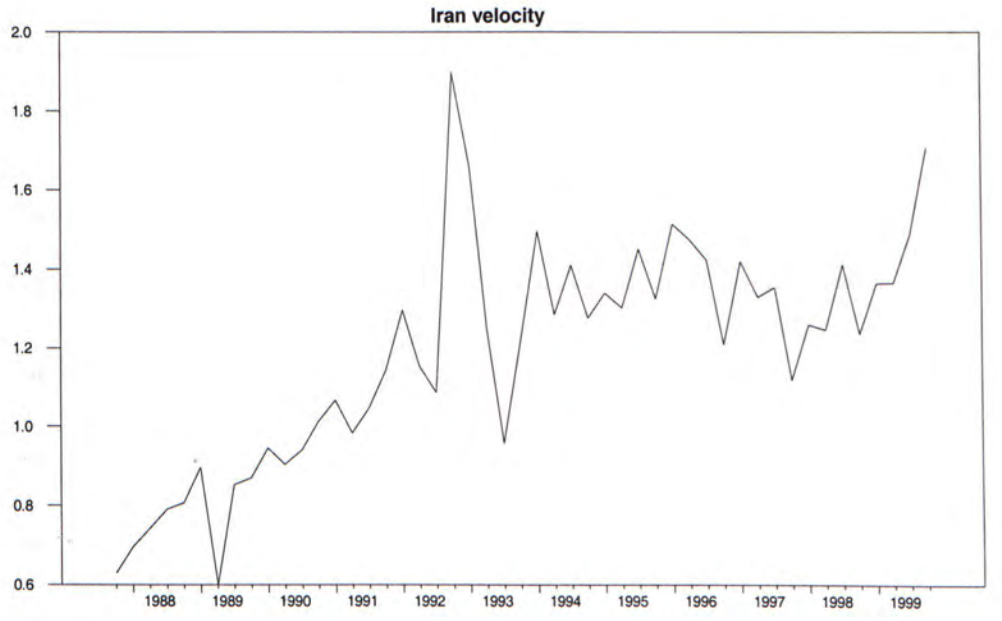


Figure 2.1z6: Iran M1 velocity

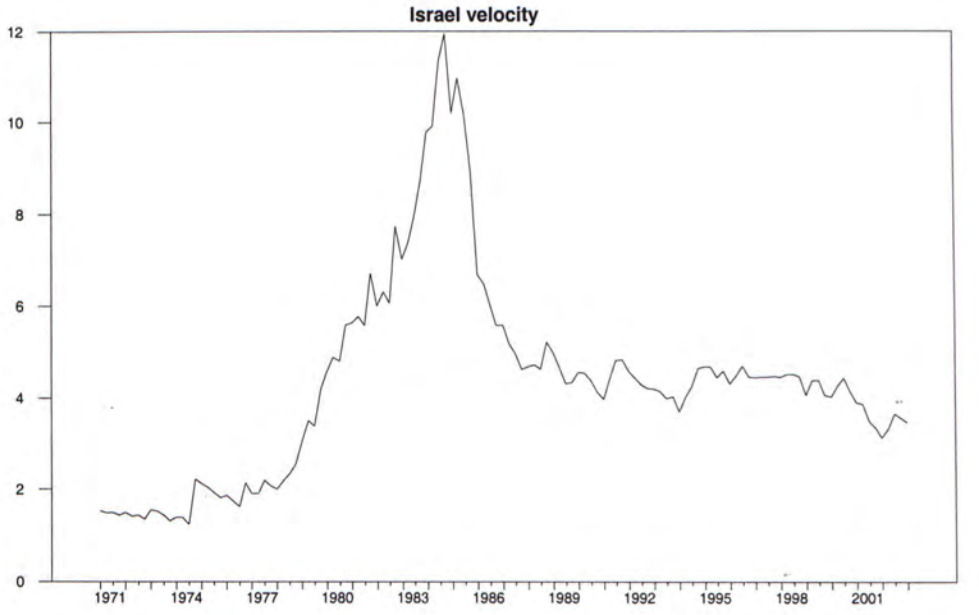


Figure 2.1aa: Israel M1 velocity

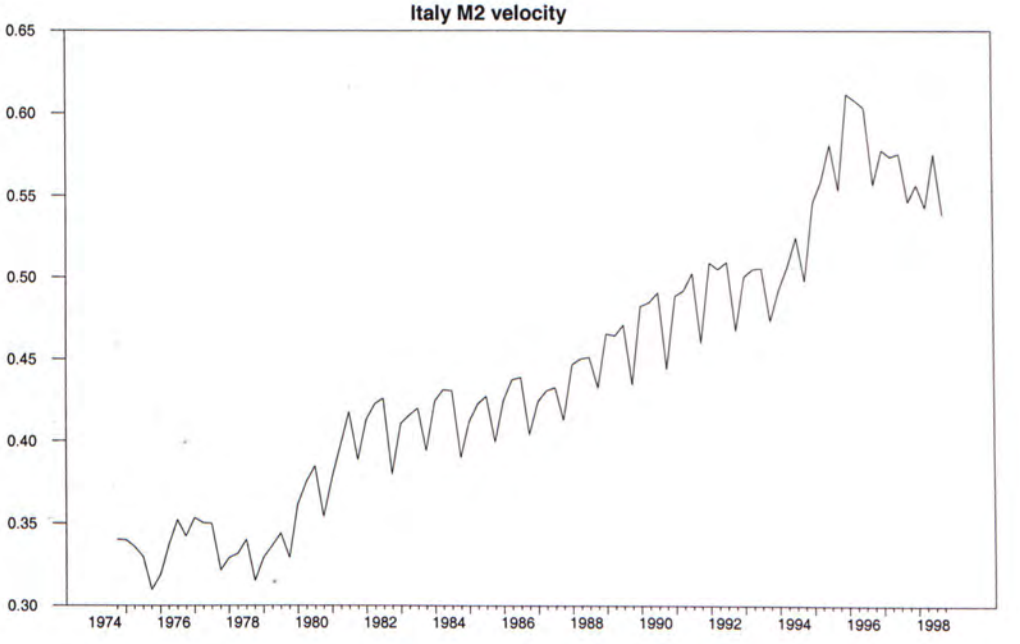


Figure 2.1ab: Italy M2 velocity

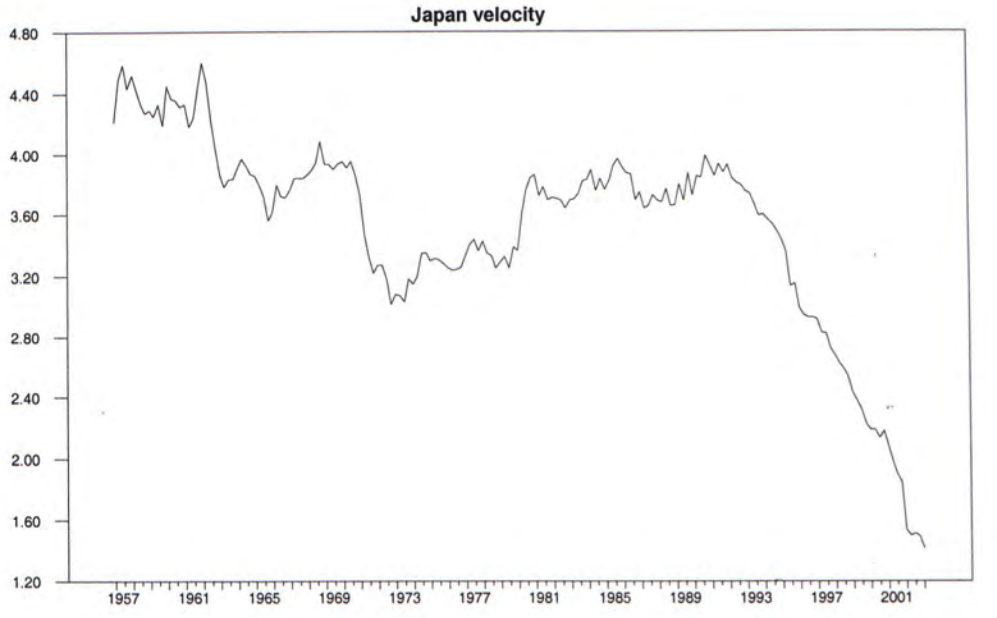


Figure 2.1ac: Japan M1 velocity

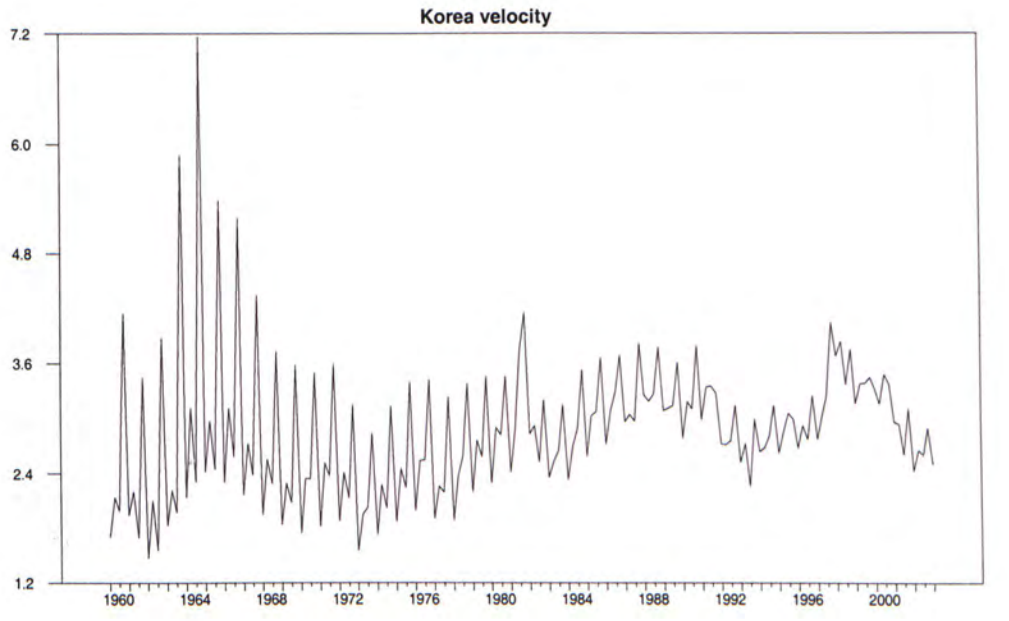


Figure 2.1ad: Korea M1 velocity

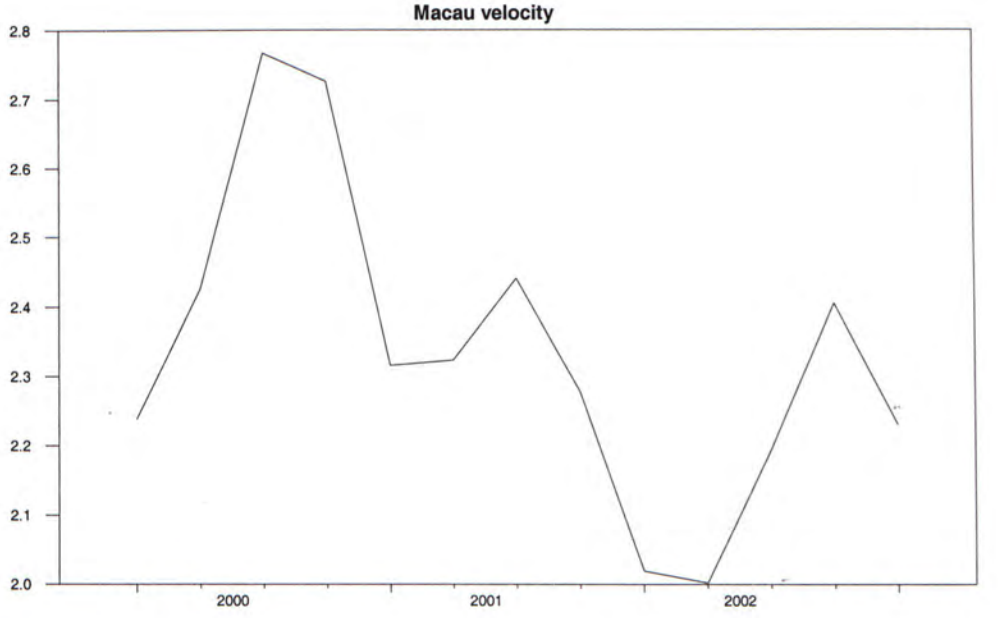


Figure 2.1ae: Macau M1 velocity

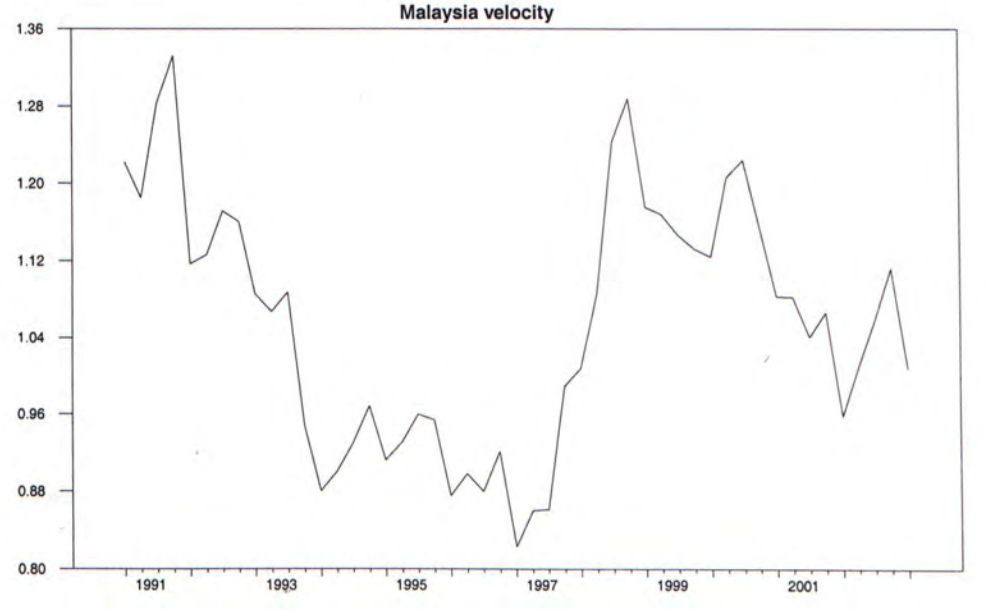


Figure 2.1af: Malaysia M1 velocity

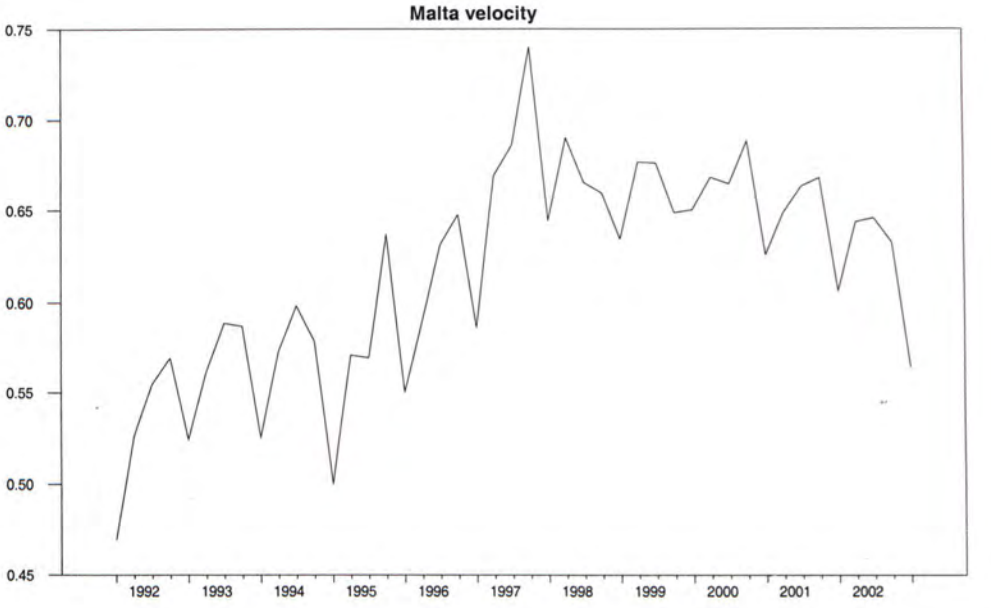


Figure 2.1ag: Malta M1 velocity

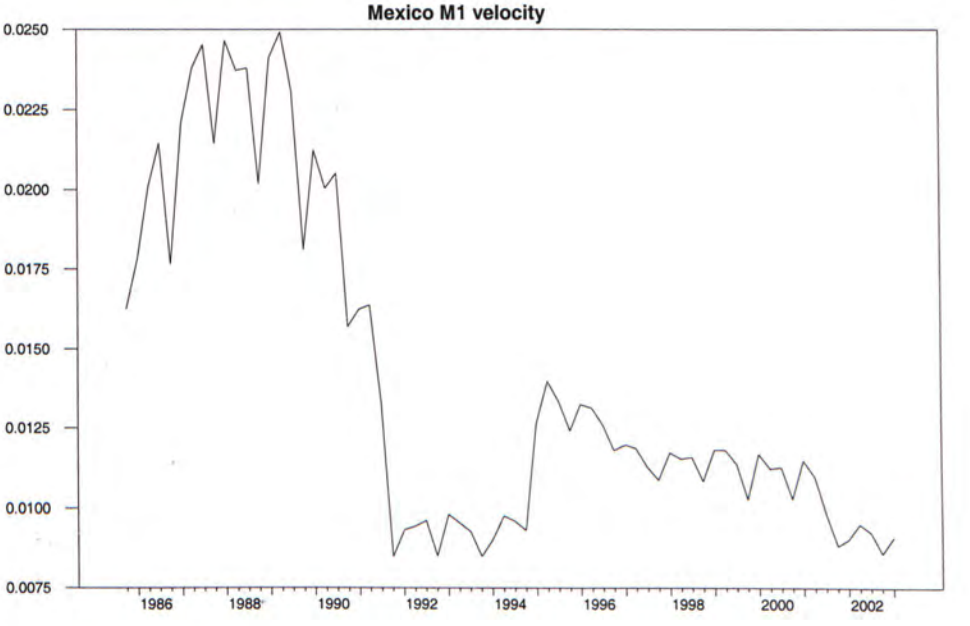


Figure 2.1ah: Mexico M1 velocity

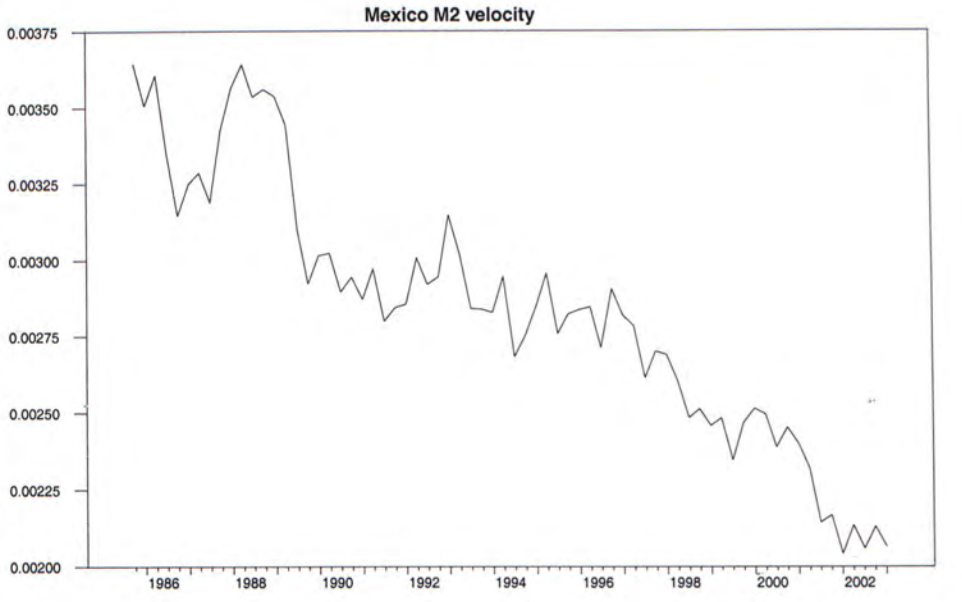


Figure 2.1ai: Mexico M2 velocity

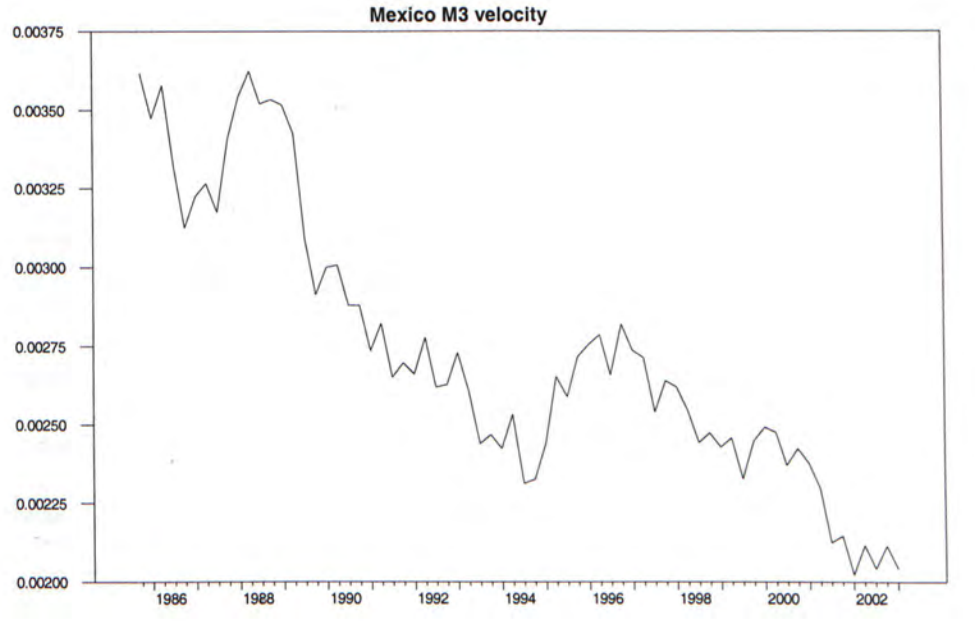


Figure 2.1aj: Mexico M3 velocity

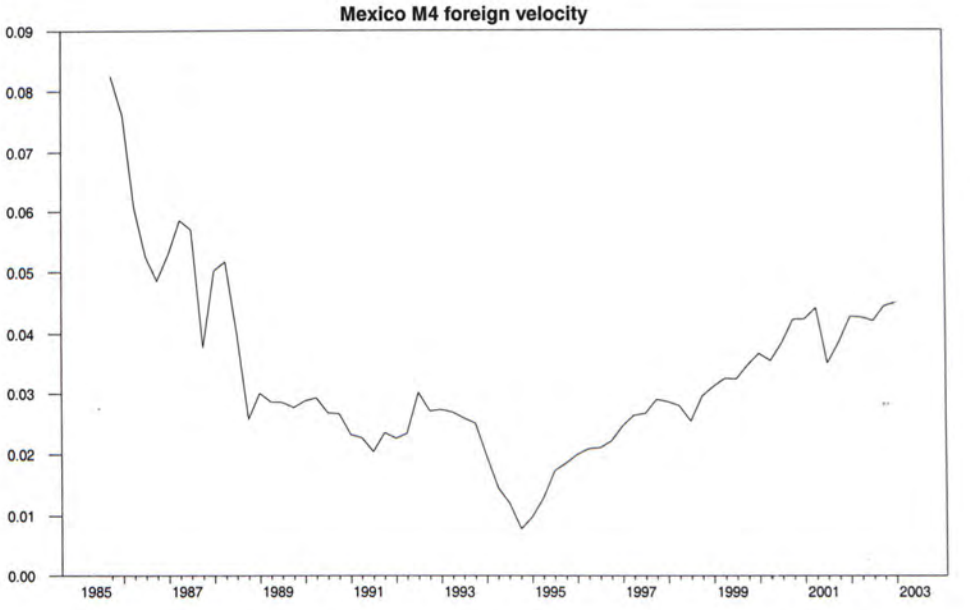


Figure 2.1ak: Mexico M4 foreign velocity

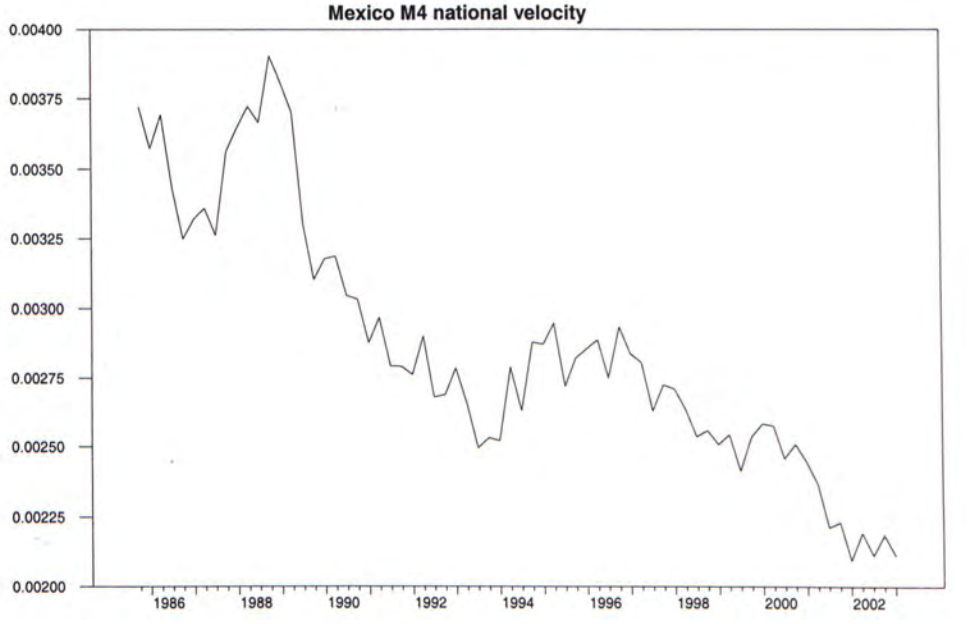


Figure 2.1al: Mexico M4 national velocity

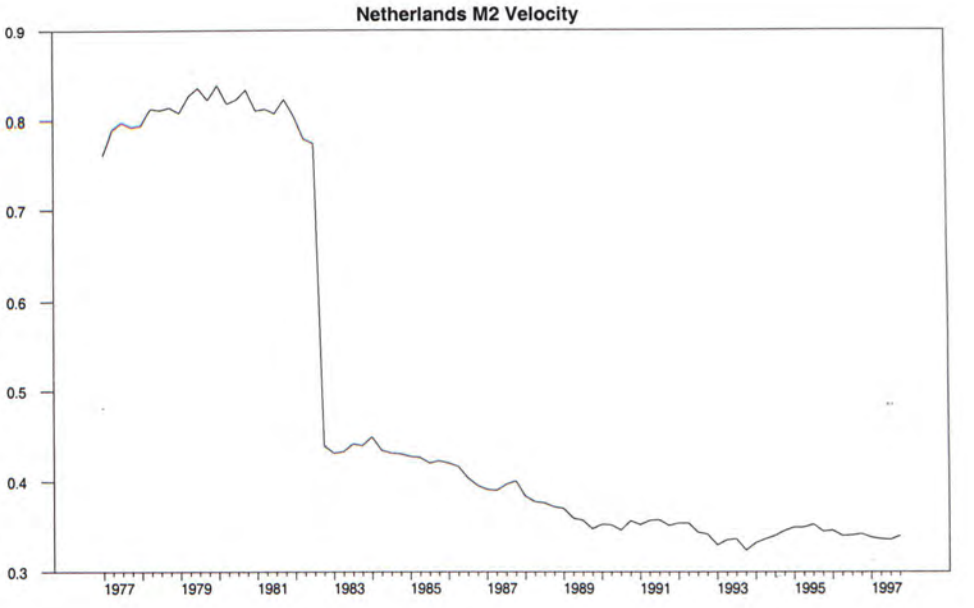


Figure 2.1am: Netherlands M2 velocity

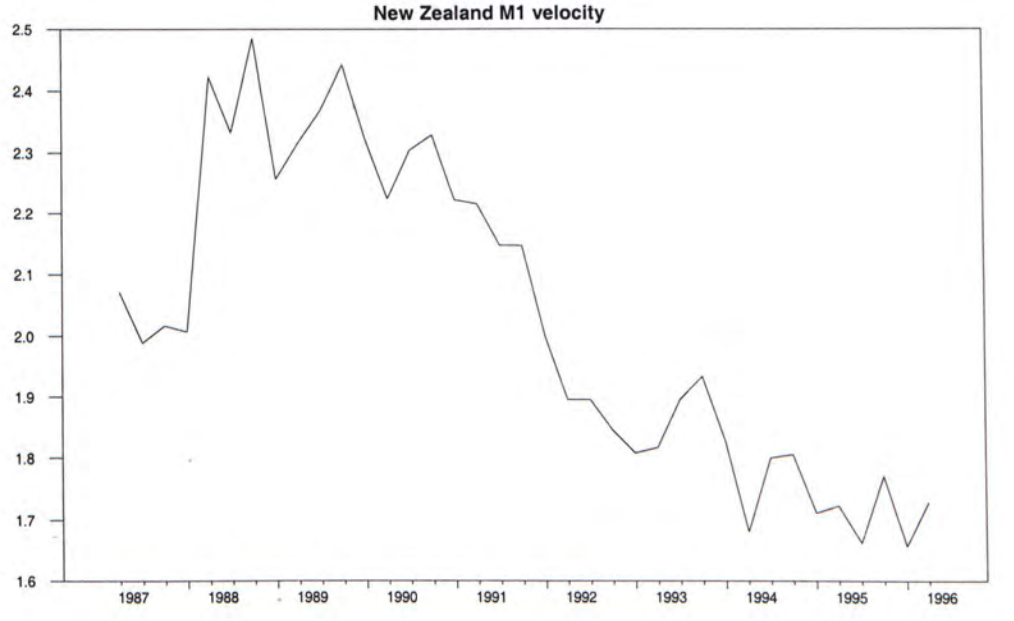


Figure 2.1an: New Zealand M1 velocity

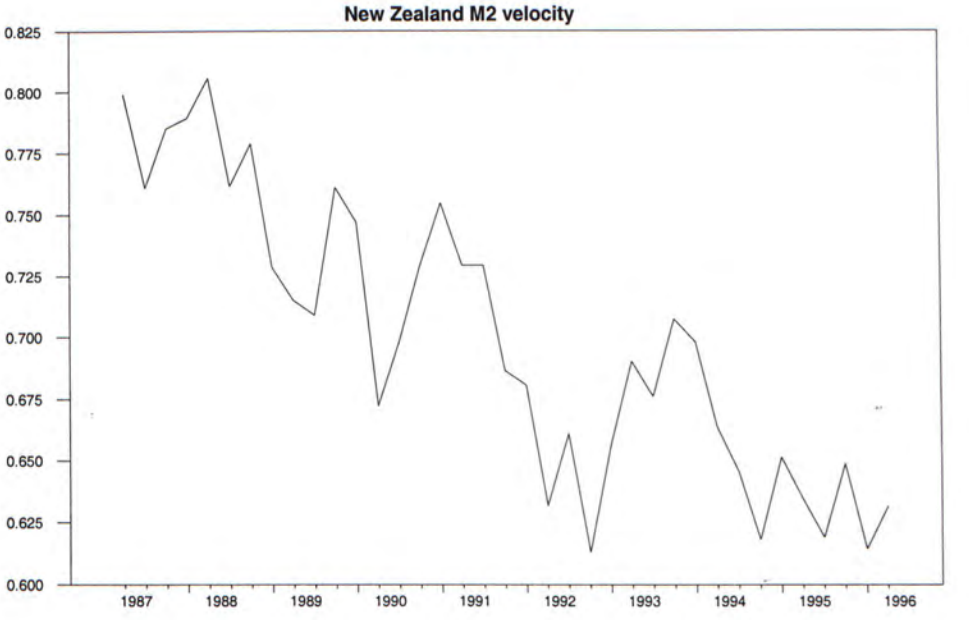


Figure 2.1ao: New Zealand M2 velocity

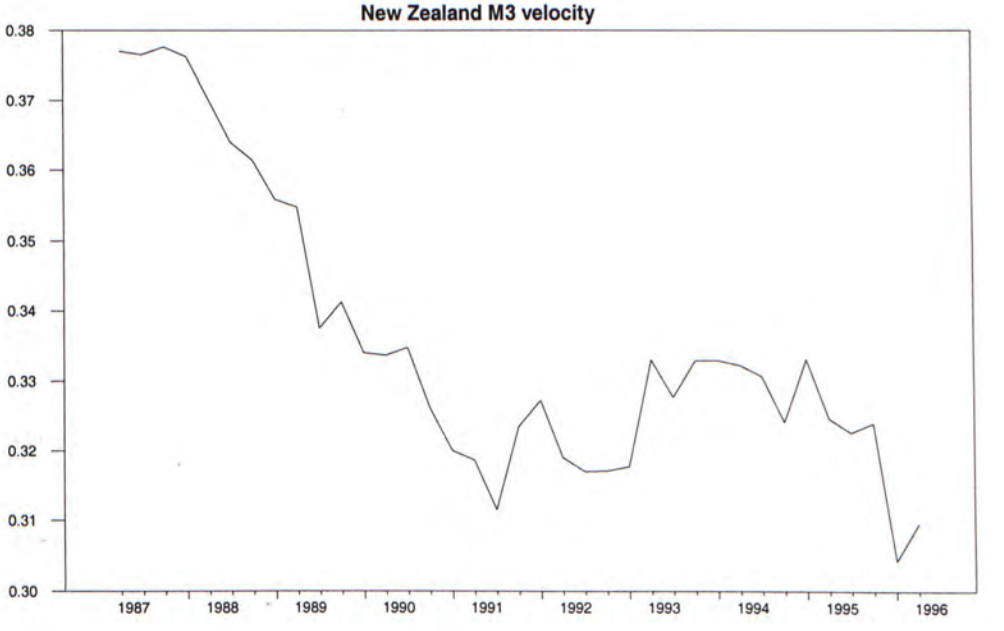


Figure 2.1ap: New Zealand M3 velocity

Figure 2.1aq: New Zealand M3 board velocity

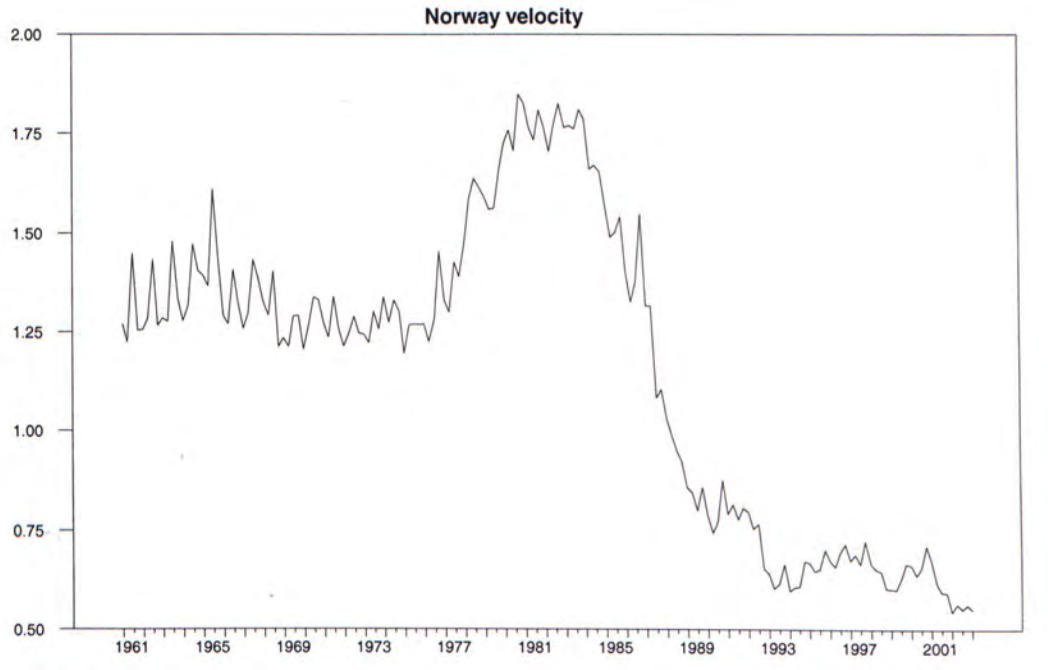


Figure 2.1ar: Norway M1 velocity

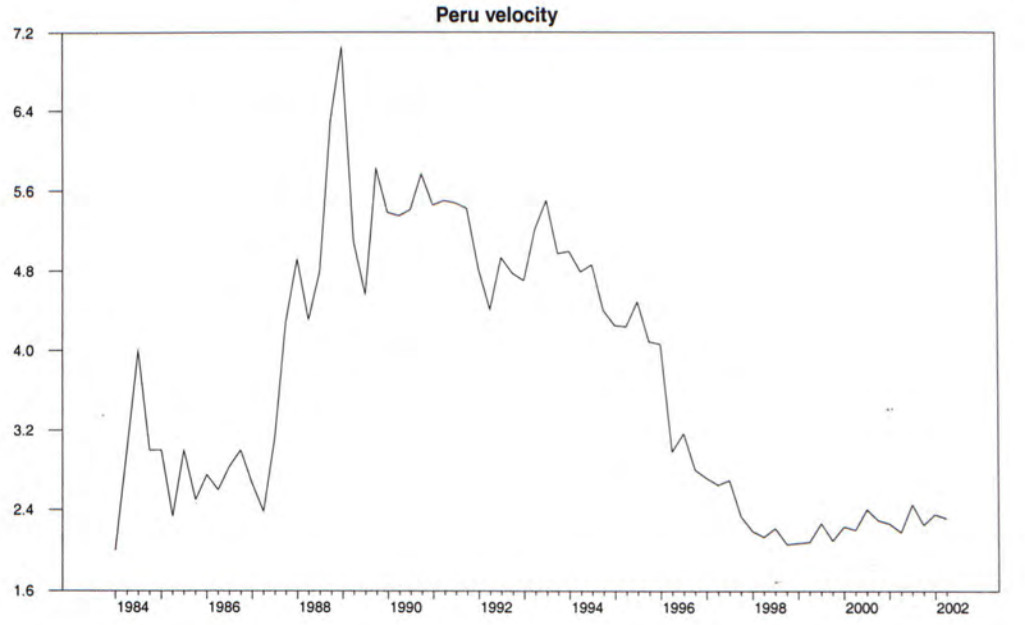


Figure 2.1as: Peru M1 velocity

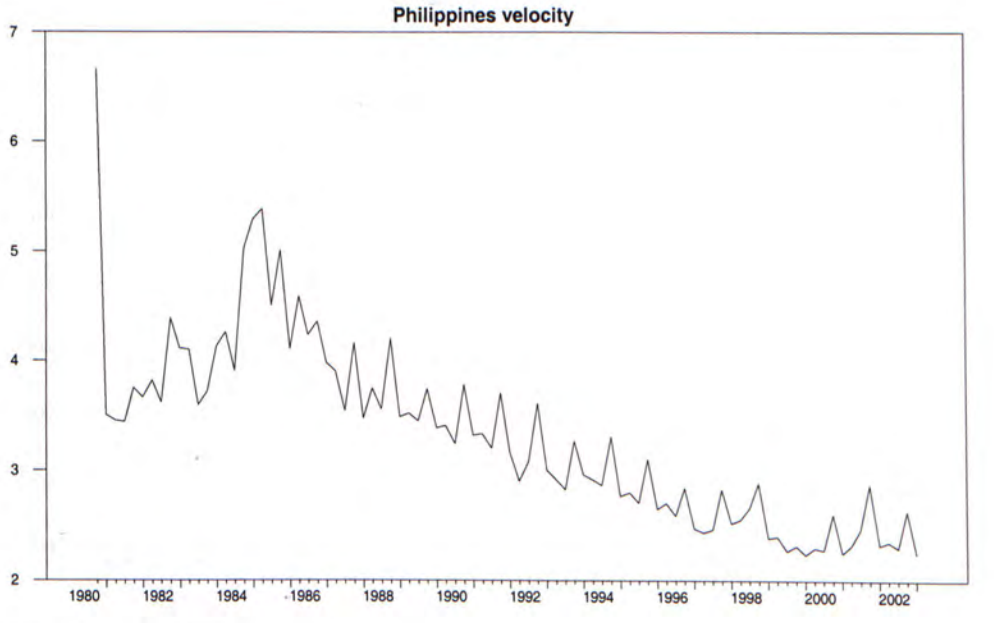
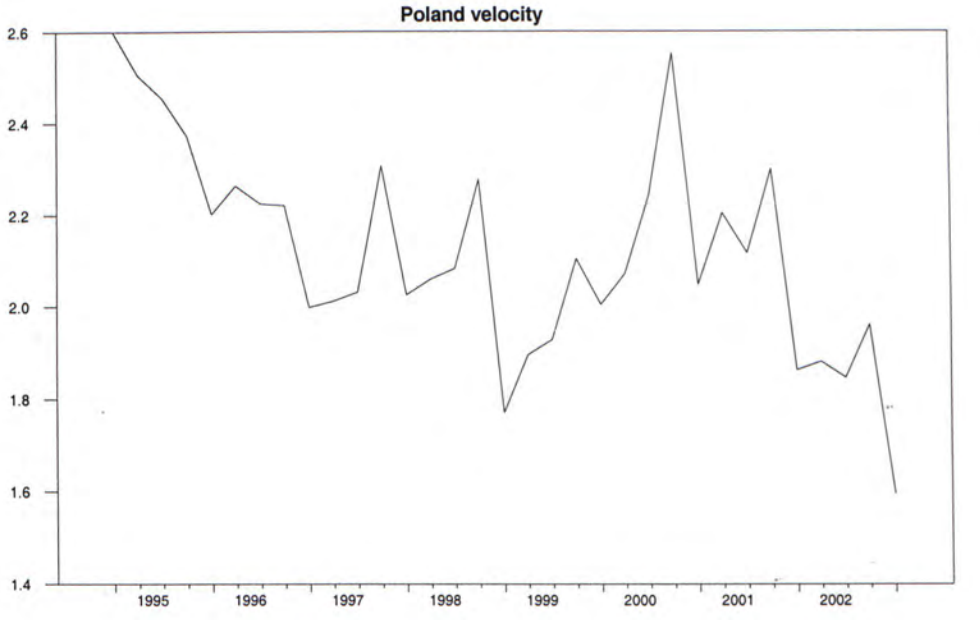


Figure 2.1at: Philippines M1 velocity



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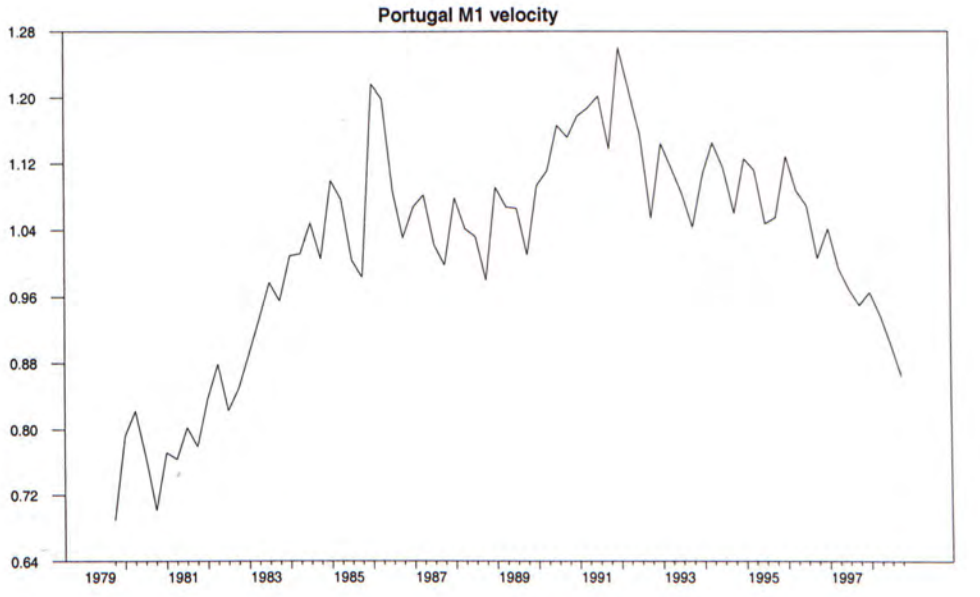

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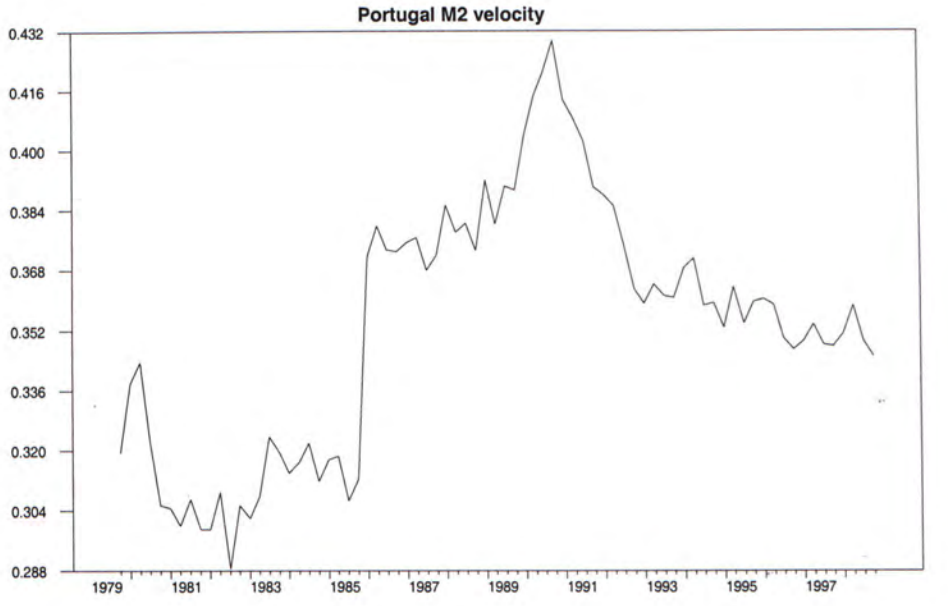


Figure 2.1aw: Portugal M2 velocity

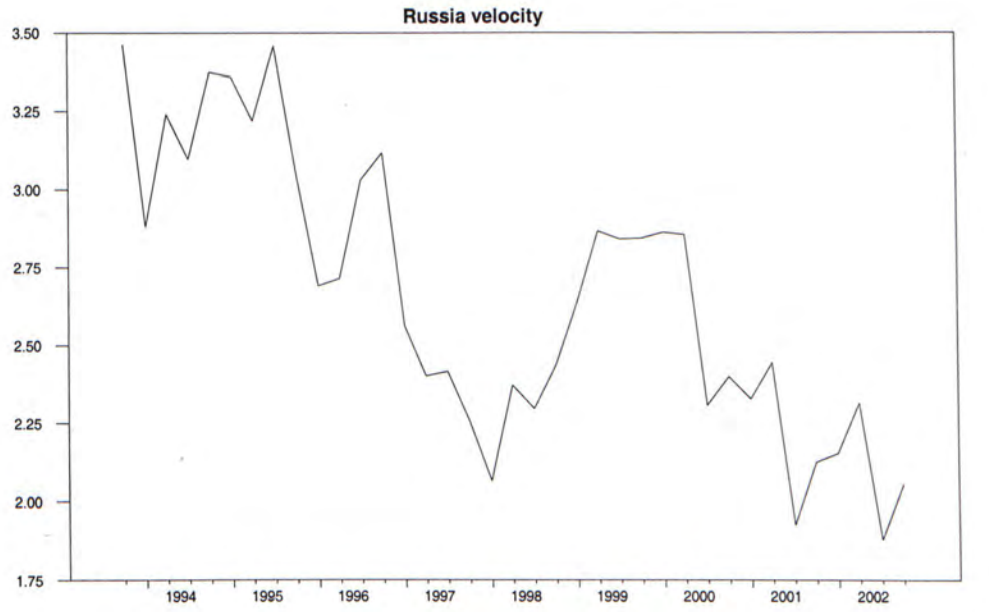
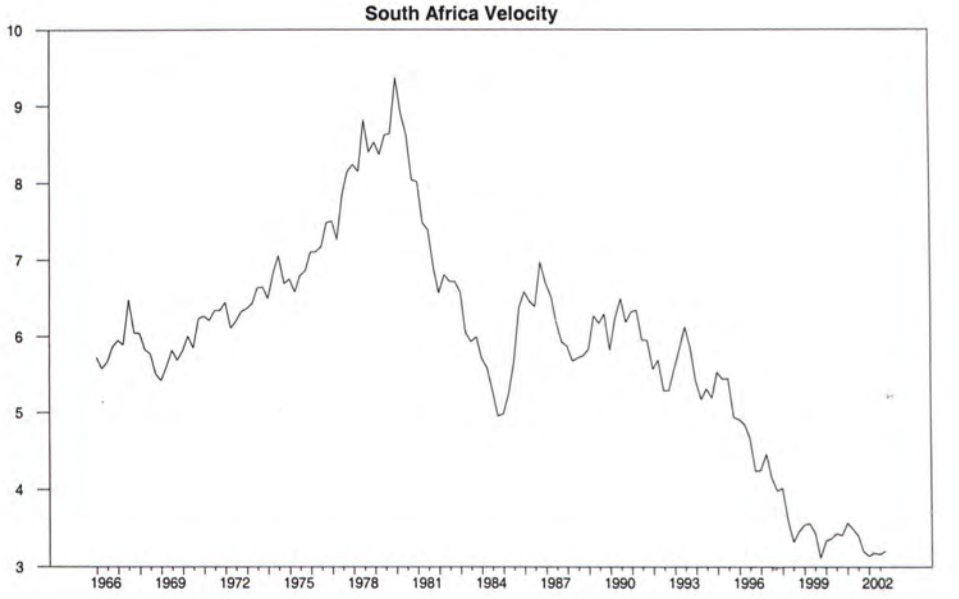


Figure 2.1ax: Russia M1 velocity



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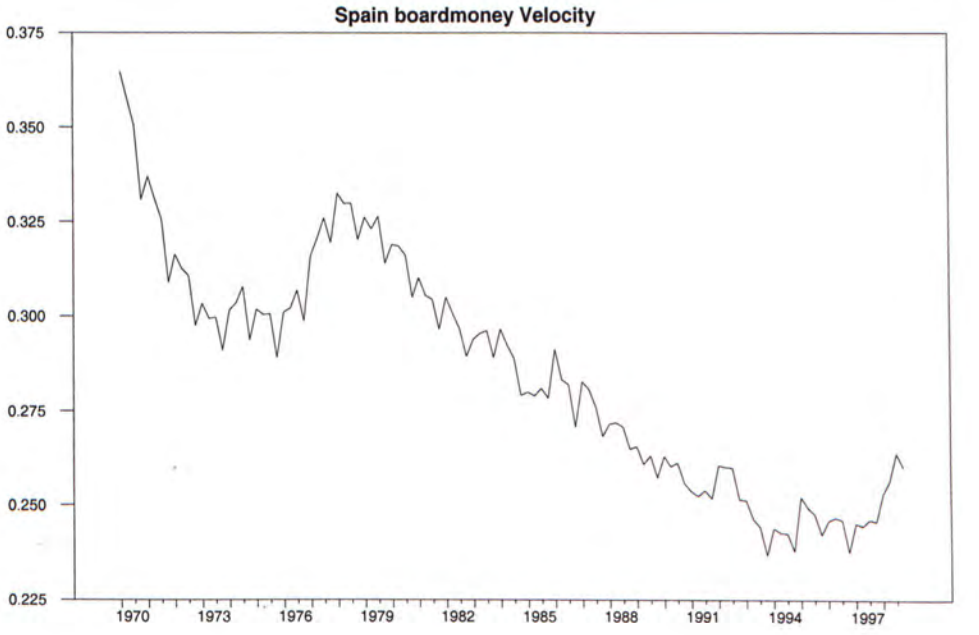


Figure 2.1az: Spain boardmoney velocity

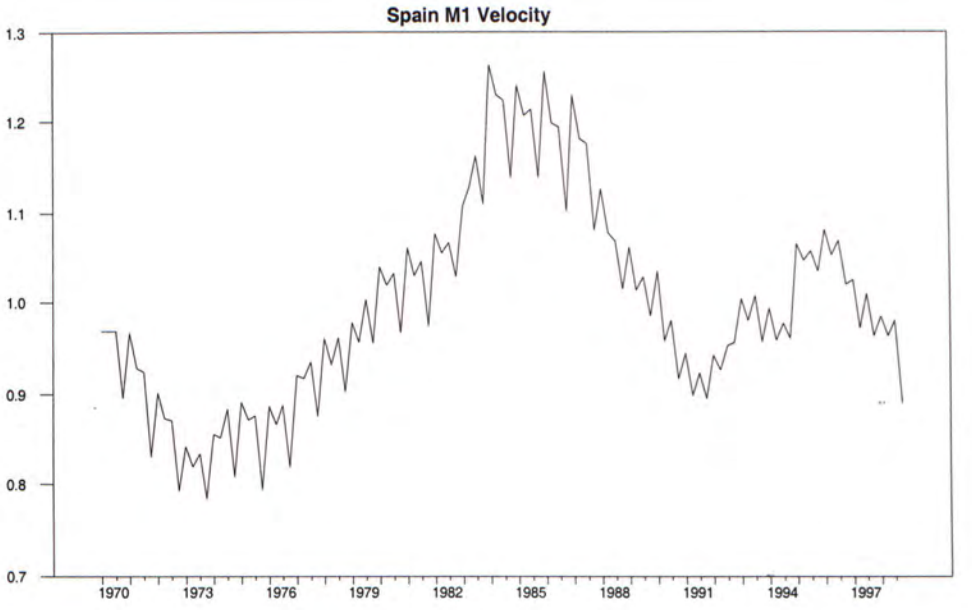


Figure 2.1ba: Spain M1 velocity

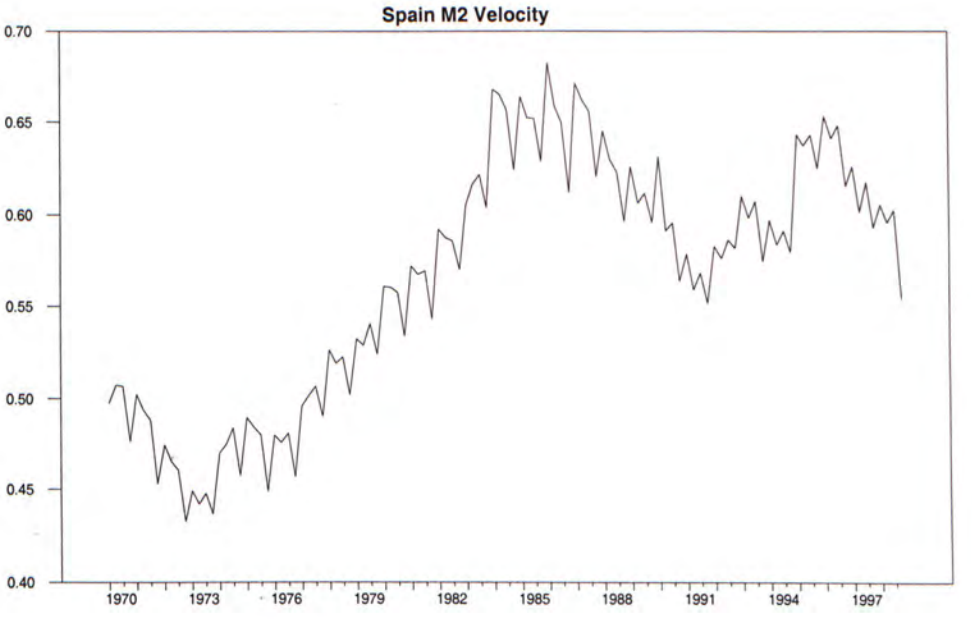
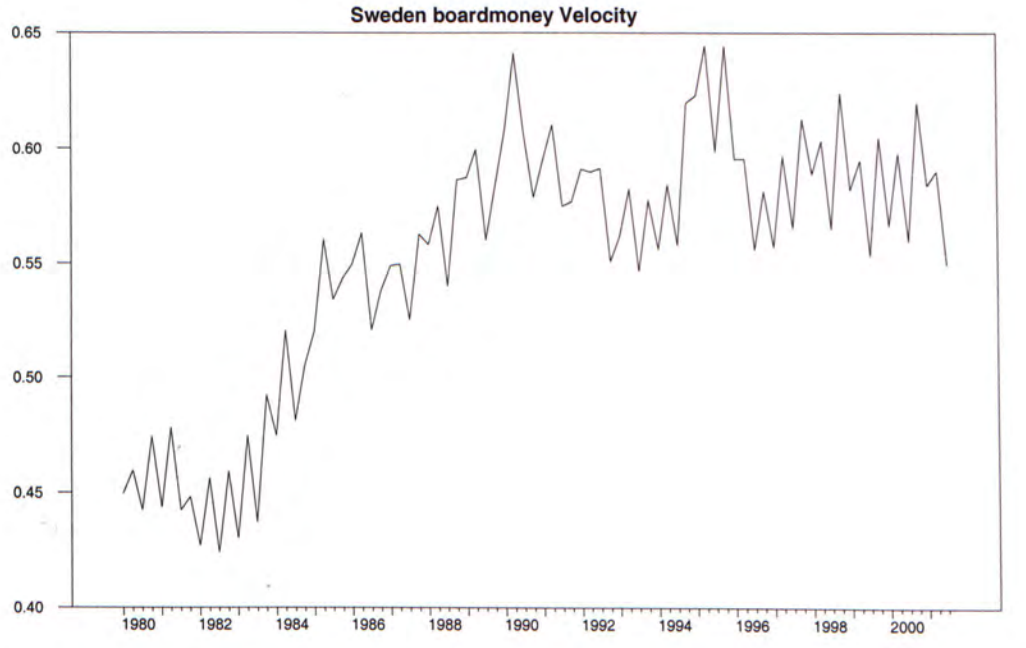


Figure 2.1bb: Spain M2 velocity

Figure 2.1bc: Spain M3 velocity



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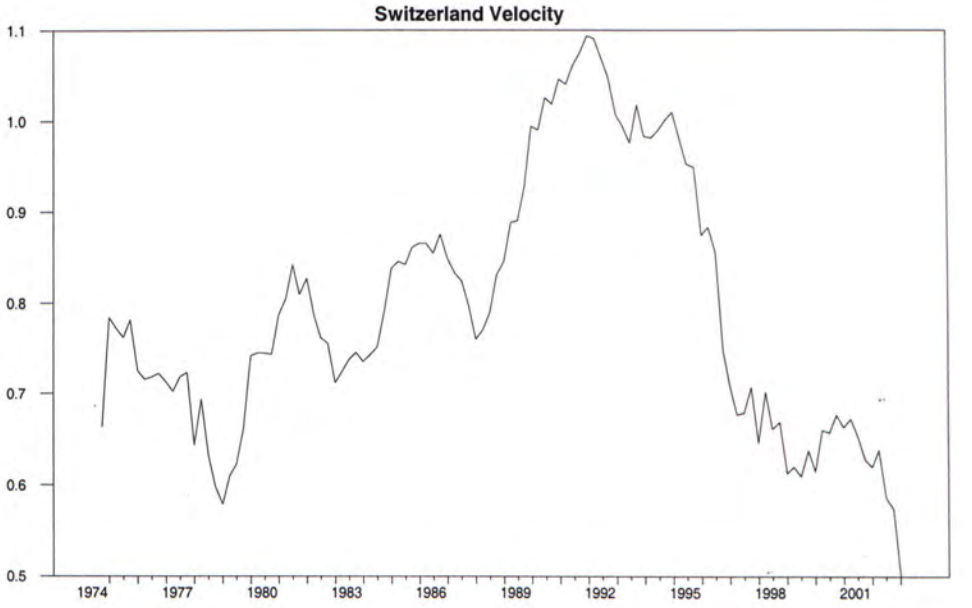

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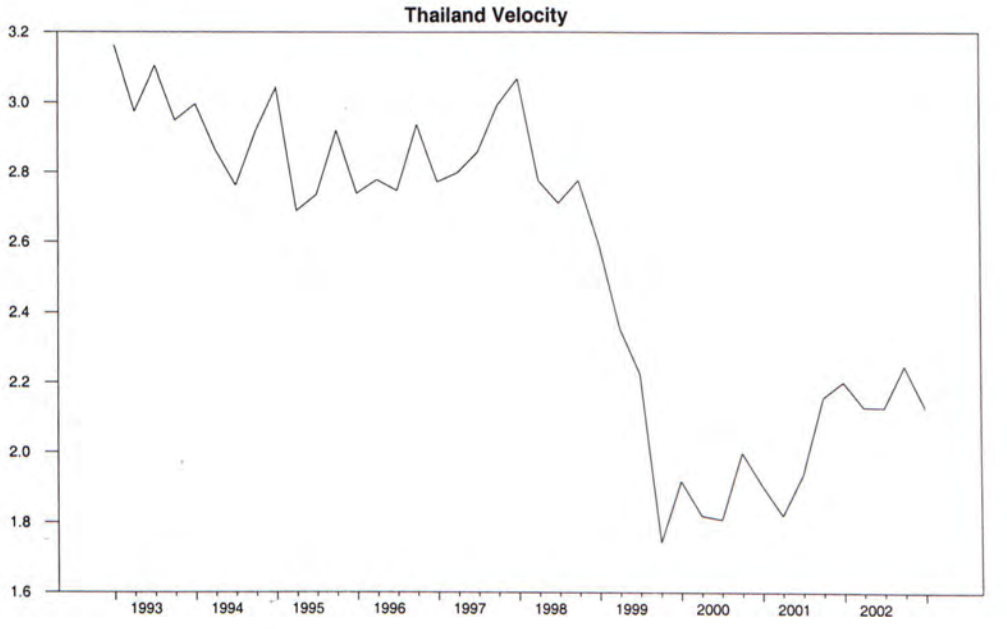

Figure 2.1bf: Thailand M1 velocity

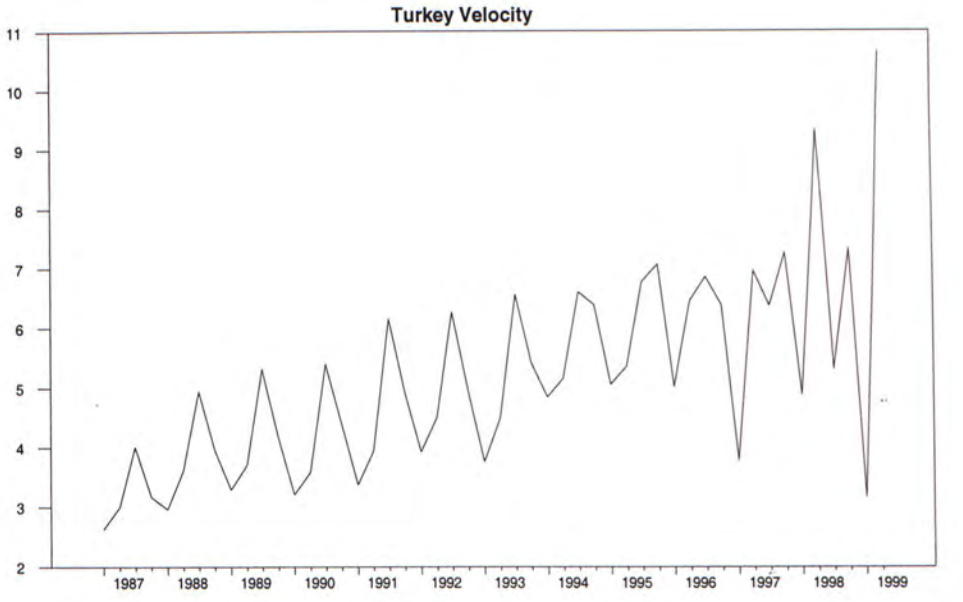

Figure 2.1bg: Turkey M1 velocity

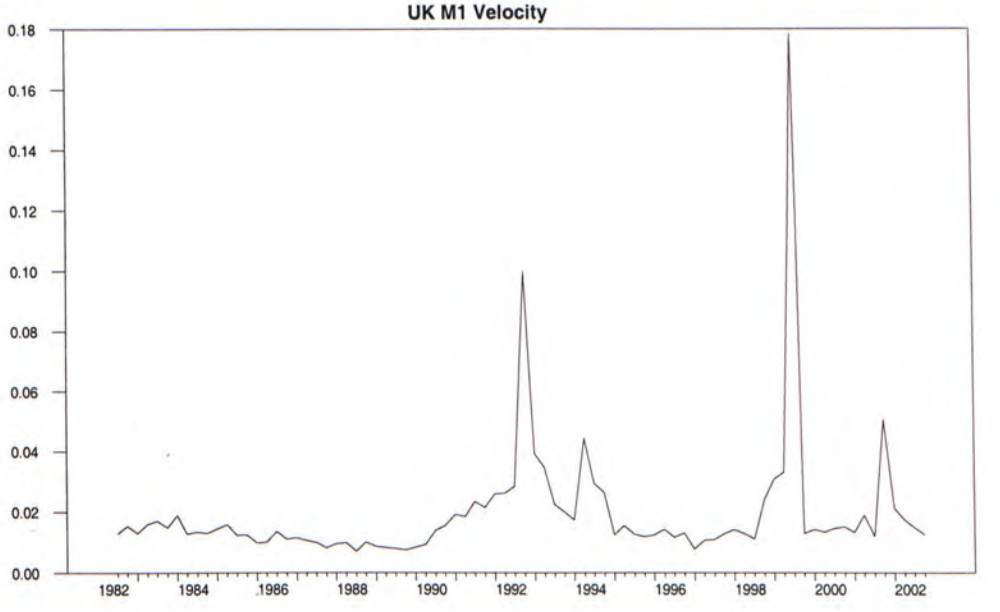

Figure 2.1bh: UK M1 velocity

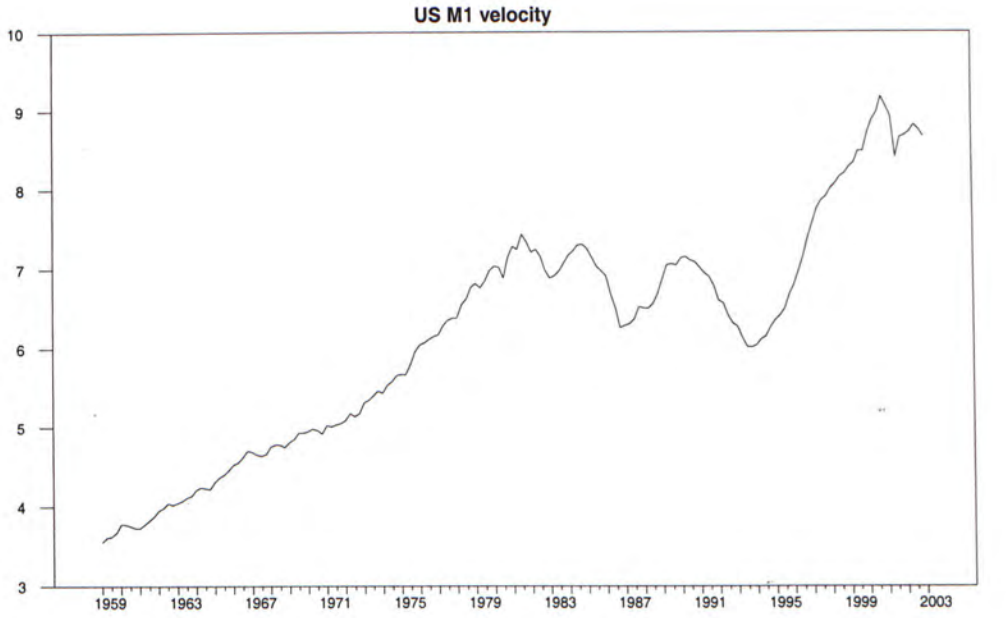

Figure 2.1bi: US M1 velocity

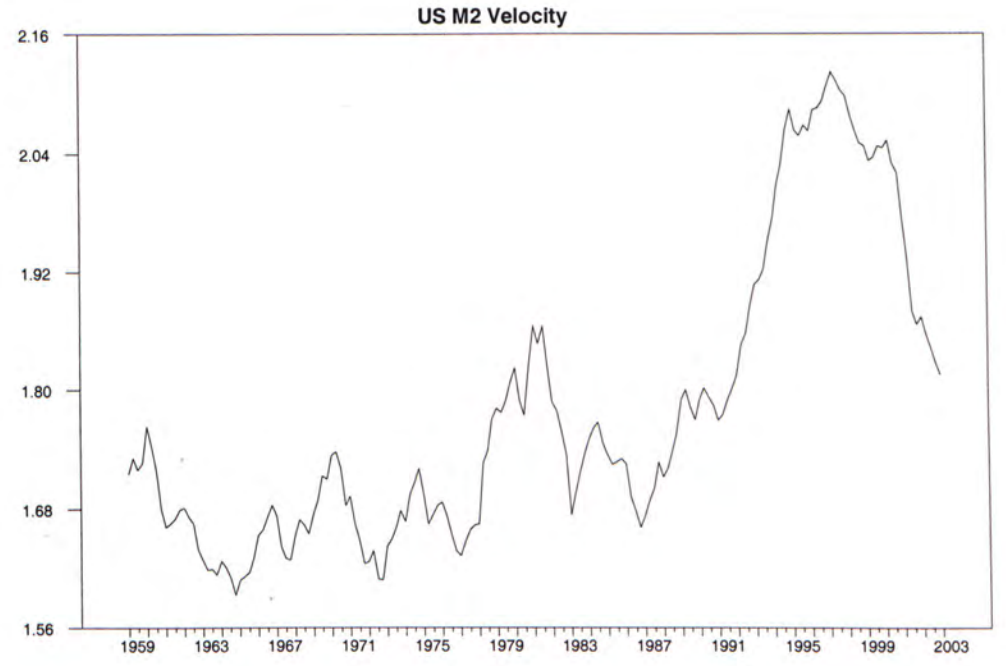

Figure 2.1bj: US M2 velocity

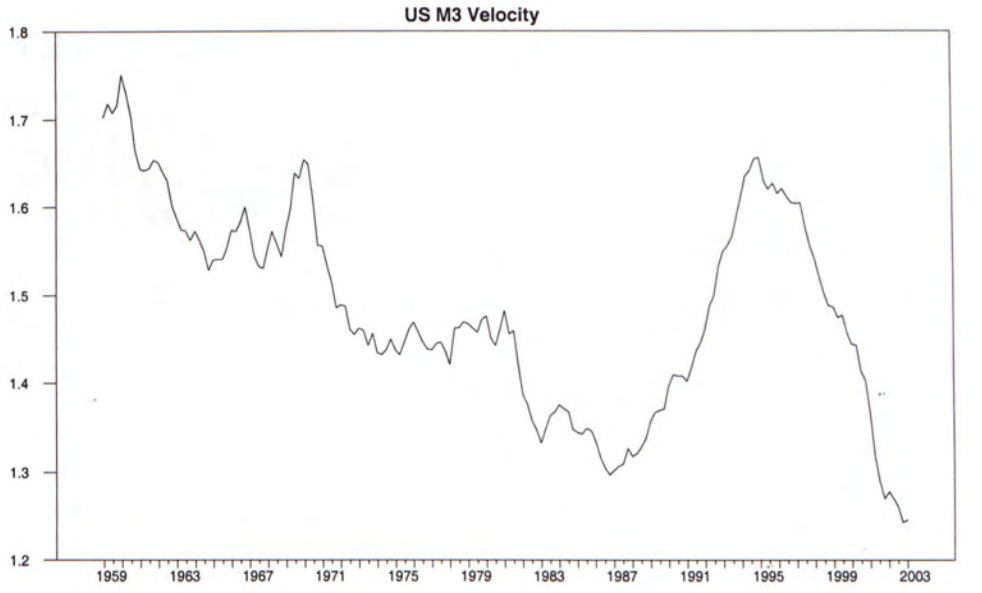

Figure 2.1bk: US M3 velocity

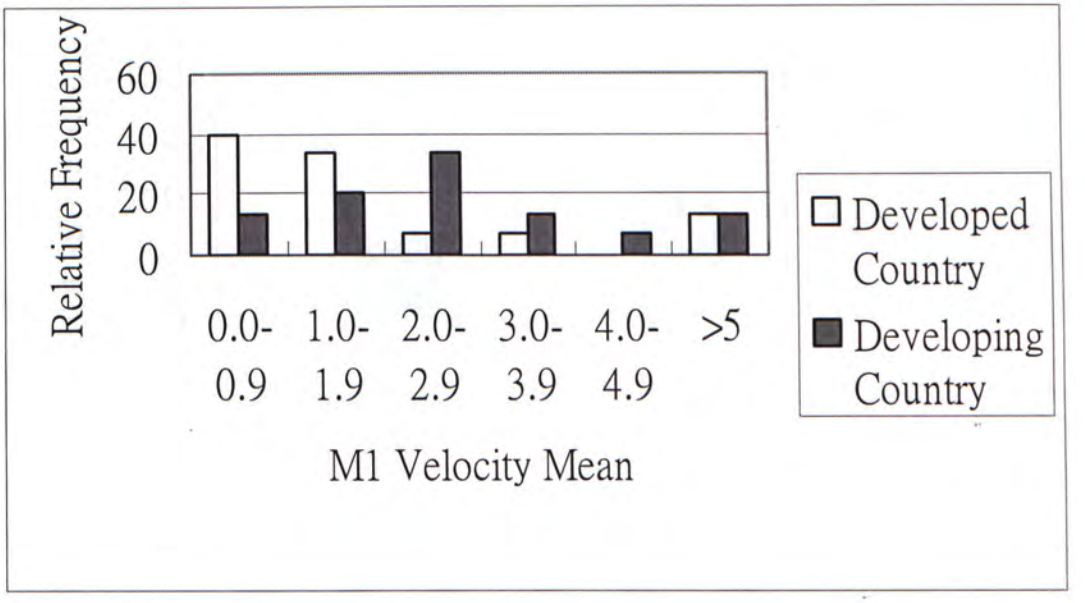

Figure 2.2: Distribution of the M1 velocity mean

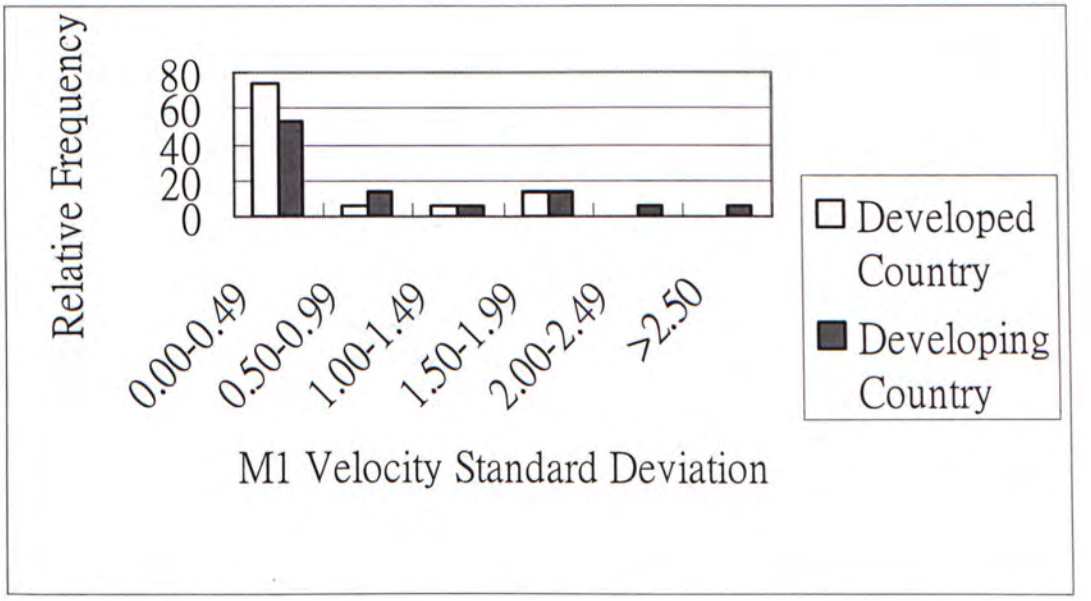

Figure 2.3: Distribution of the M1 velocity standard deviation

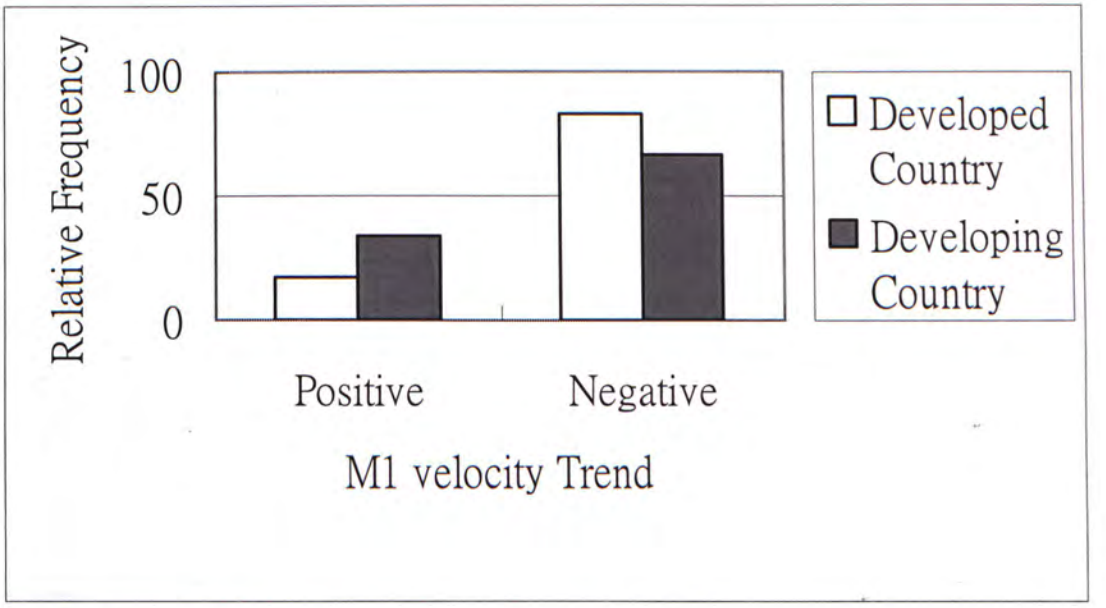

Figure 2.4: Distribution of the M1 velocity trend

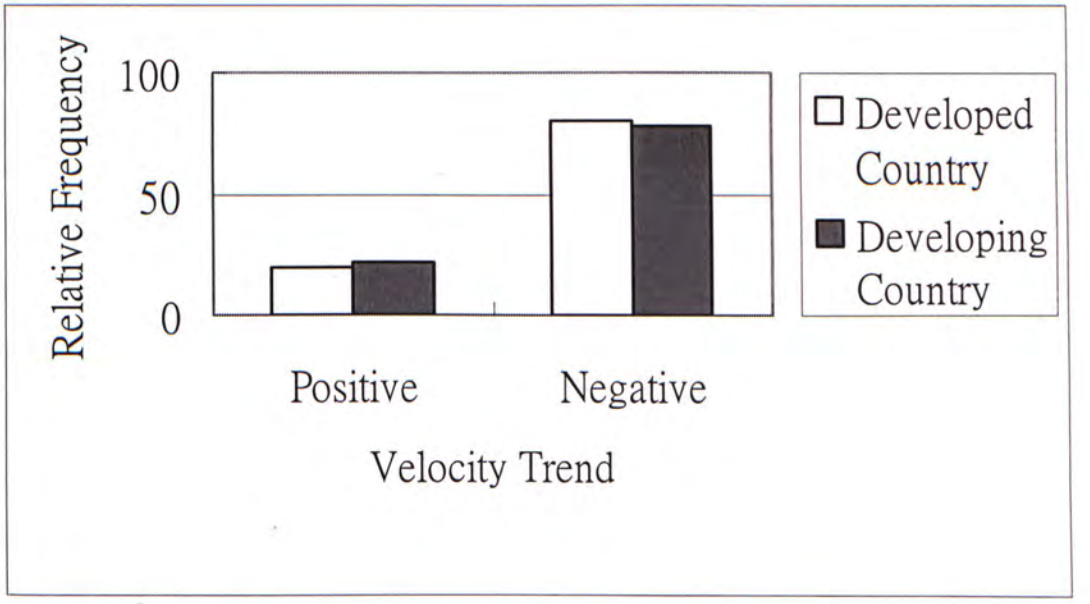

Figure 2.5: Distribution of the velocity mean

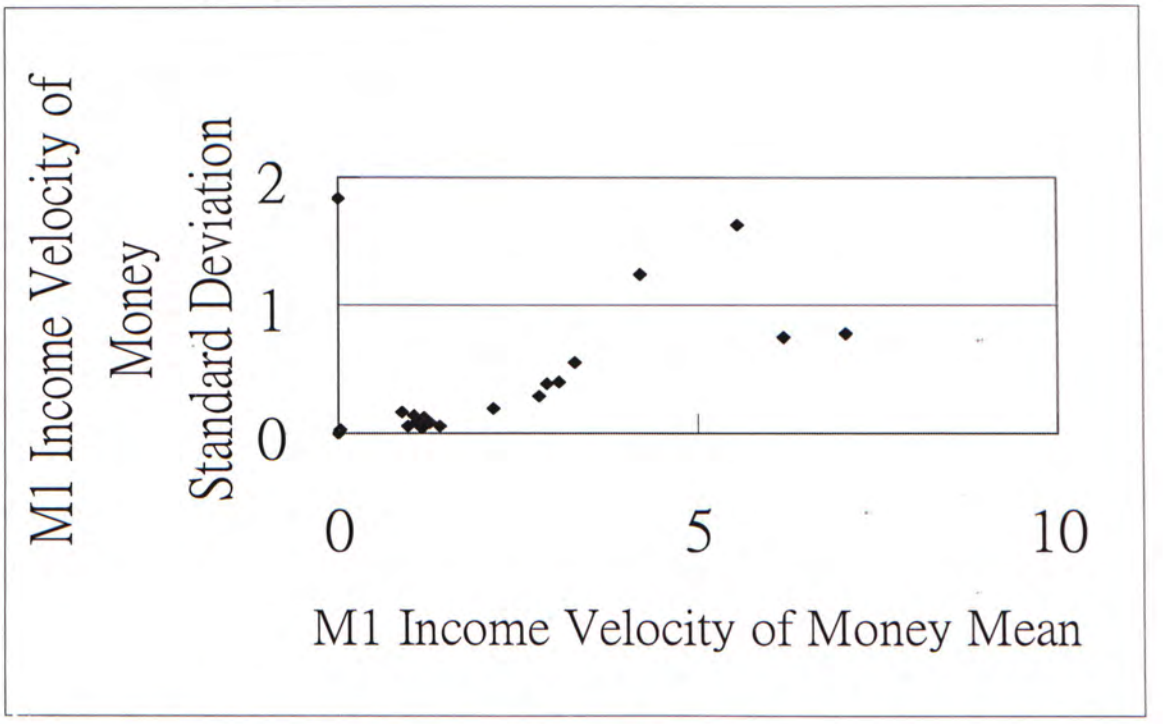

Figure 2.6. The relationship between M1 Velocity Mean and Standard Deviation in the 90s

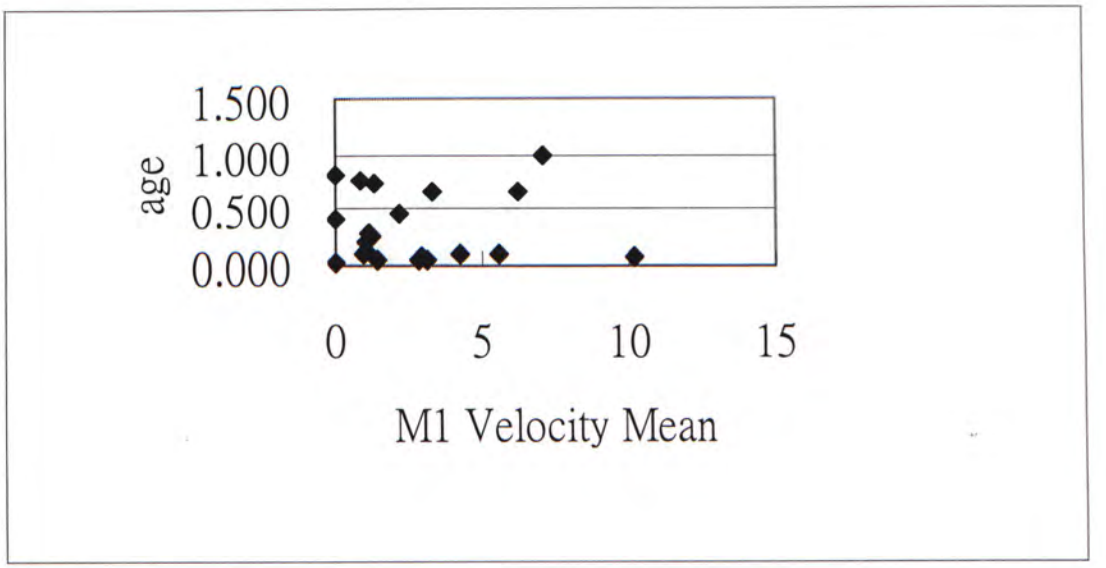

Figure 2.7. The relationship between M1 Velocity Mean and Age of democracy in the 90s

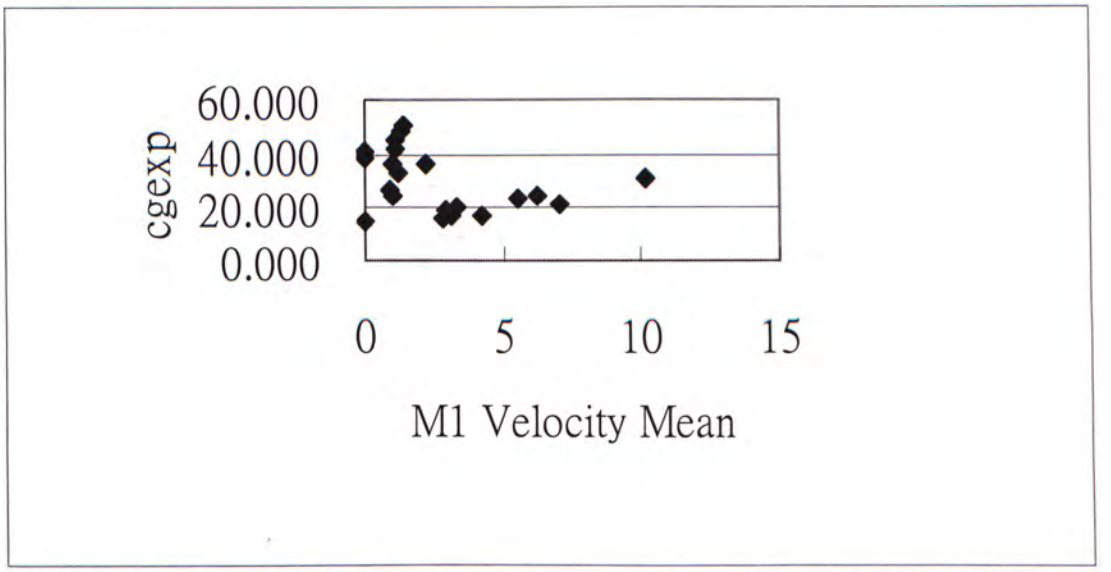

Figure 2.8. The relationship between M1 Velocity Mean and Central government expenditure as a percentage of GDP in the 90s

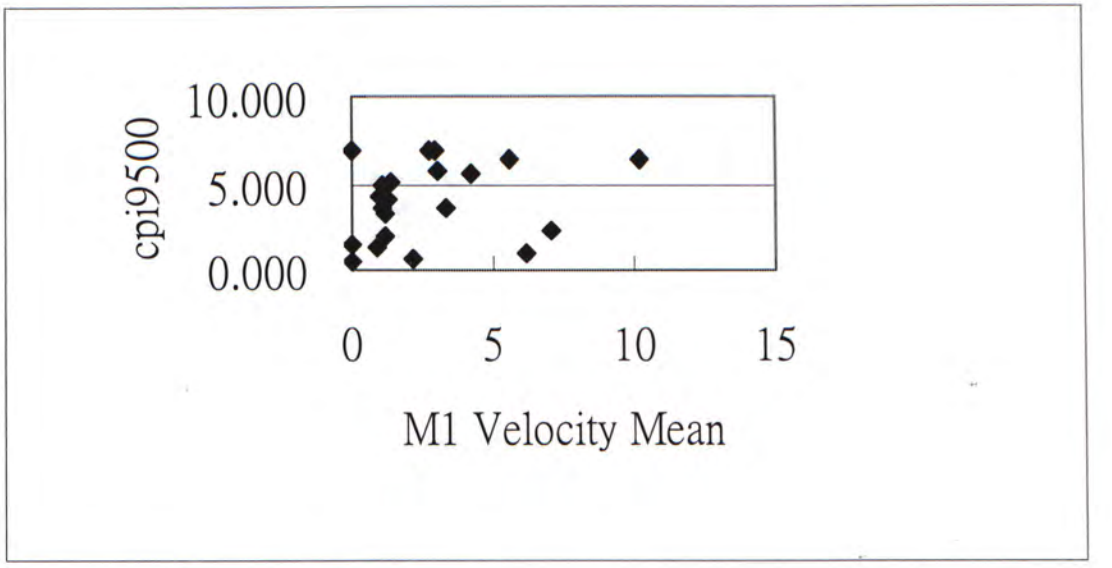

Figure 2.9. The relationship between M1 Velocity Mean and Corruption Perception Index in the 90s

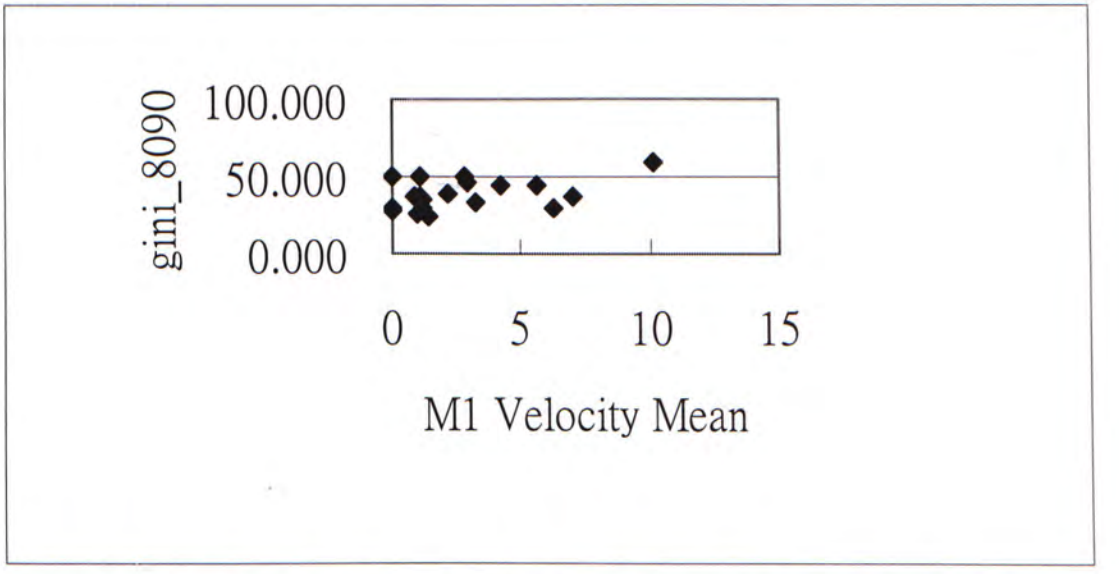

Figure 2.10. The relationship between M1 Velocity Mean and Gini index on income distribution in the 90s

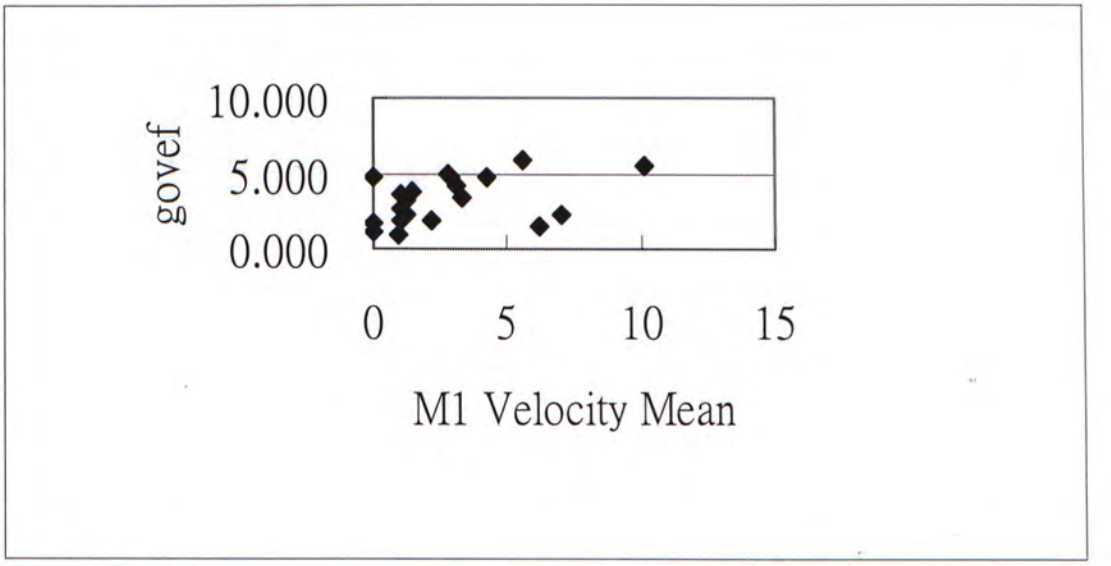

Figure 2.11. The relationship between M1 Velocity Mean and government effectiveness in the 90s

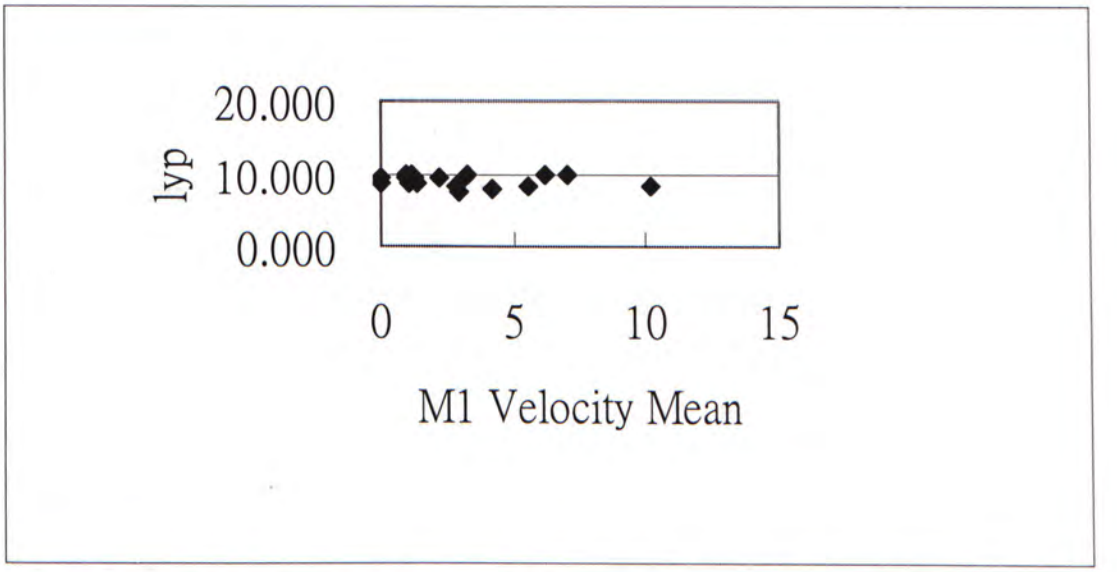

Figure 2.12. The relationship between M1 Velocity Mean and Natural log of per capita real GDP in the 90s

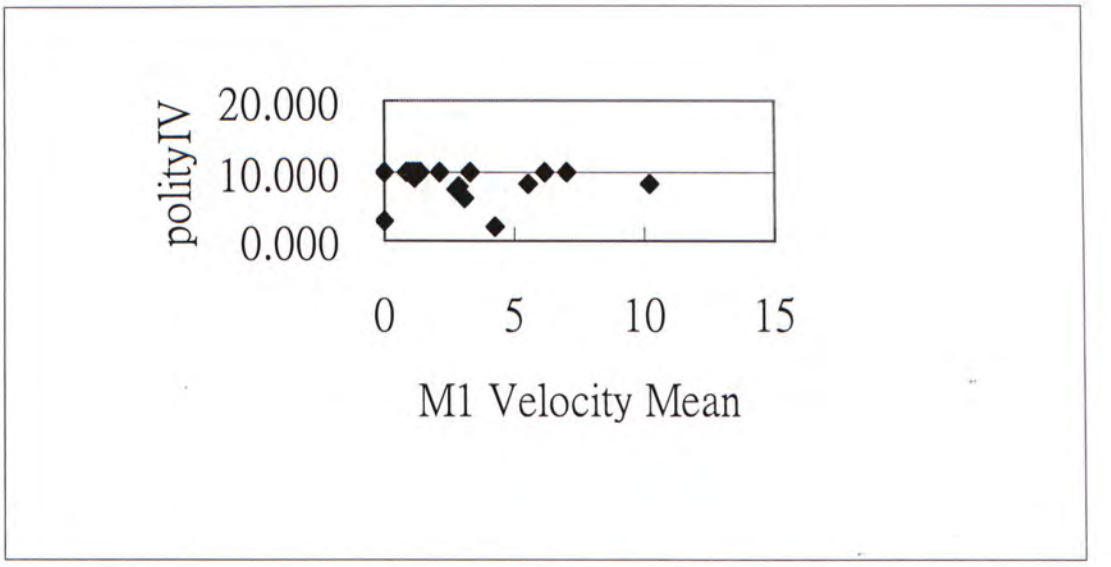

Figure 2.13. The relationship between M1 Velocity Mean and Score of democracy in the 90s

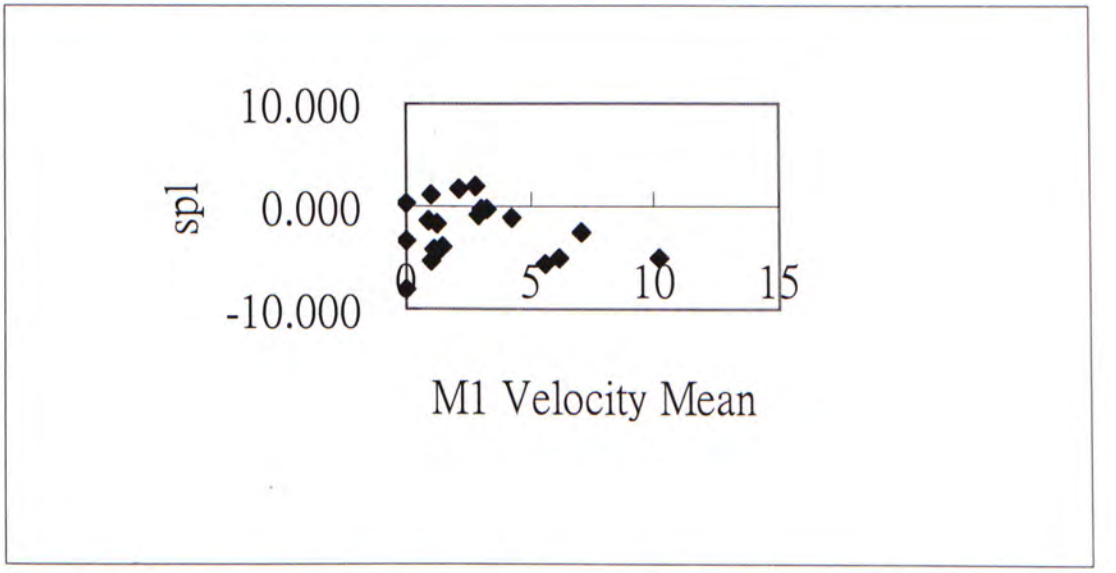

Figure 2.14. The relationship between M1 Velocity Mean and Central government budget surplus or deficit as a percentage of GDP in the 90s

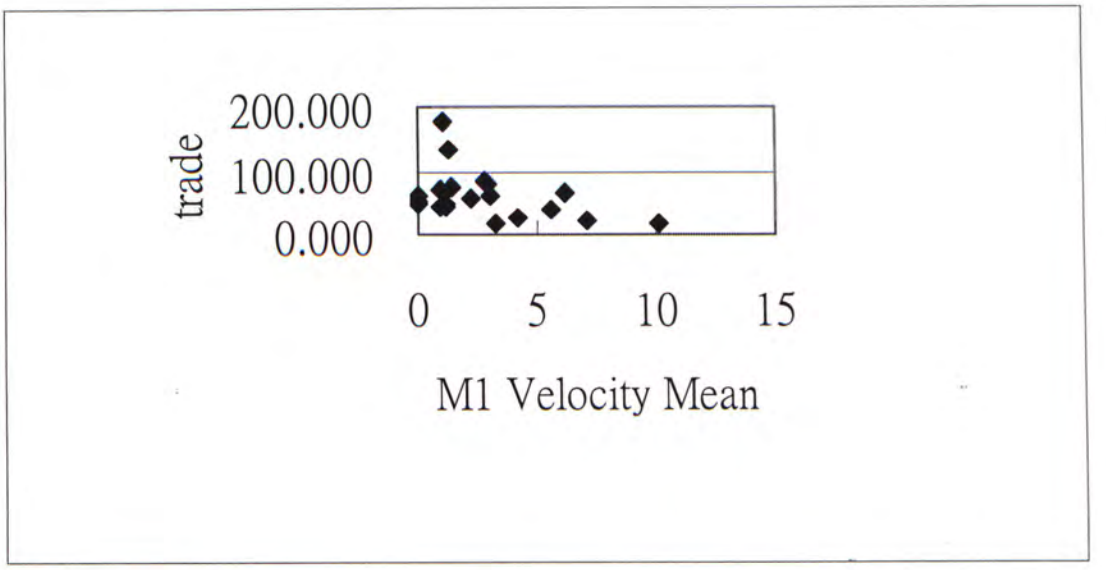

Figure 2.15. The relationship between M1 Velocity Mean and Sum of exports and imports of goods and services measured as a share of GDP in the 90s

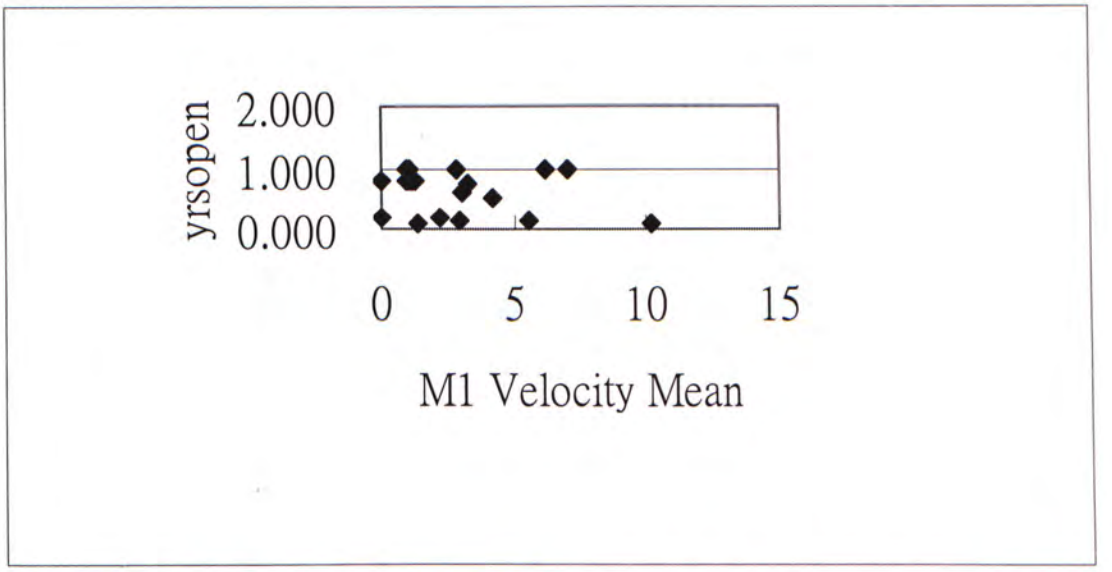

Figure 2.16.The relationship between M1 Velocity Mean and Index for openness to international trade in the 90s

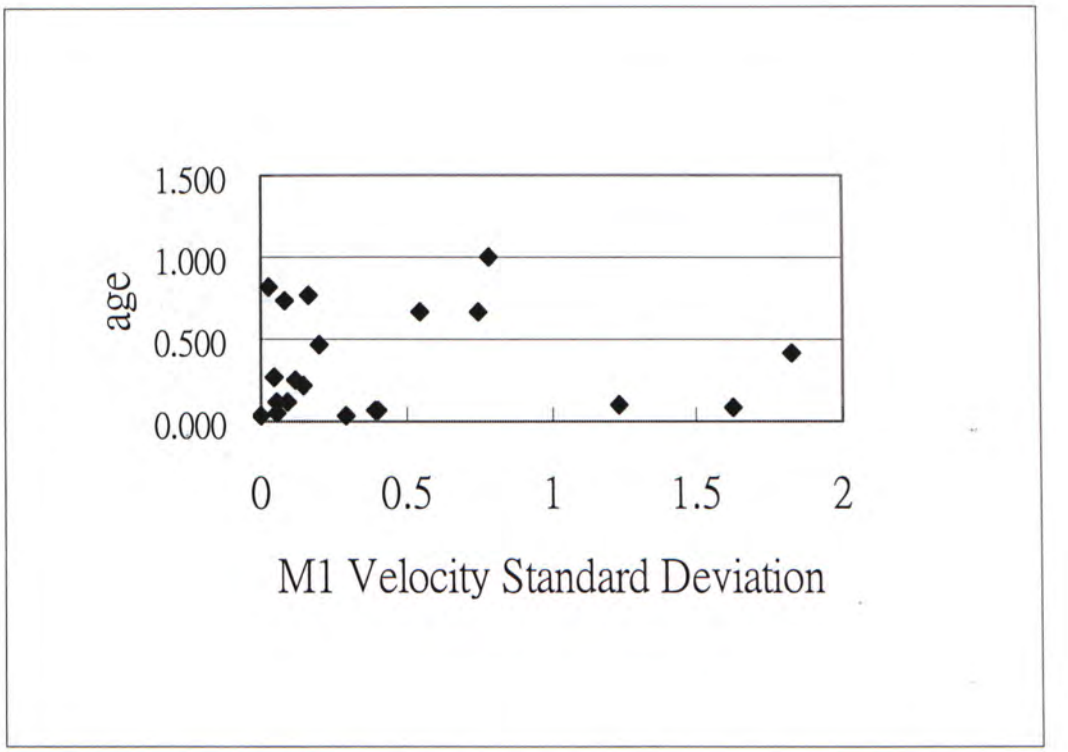

Figure 2.17.The relationship between M1 Velocity Standard Deviation and Age of democracy in the 90s

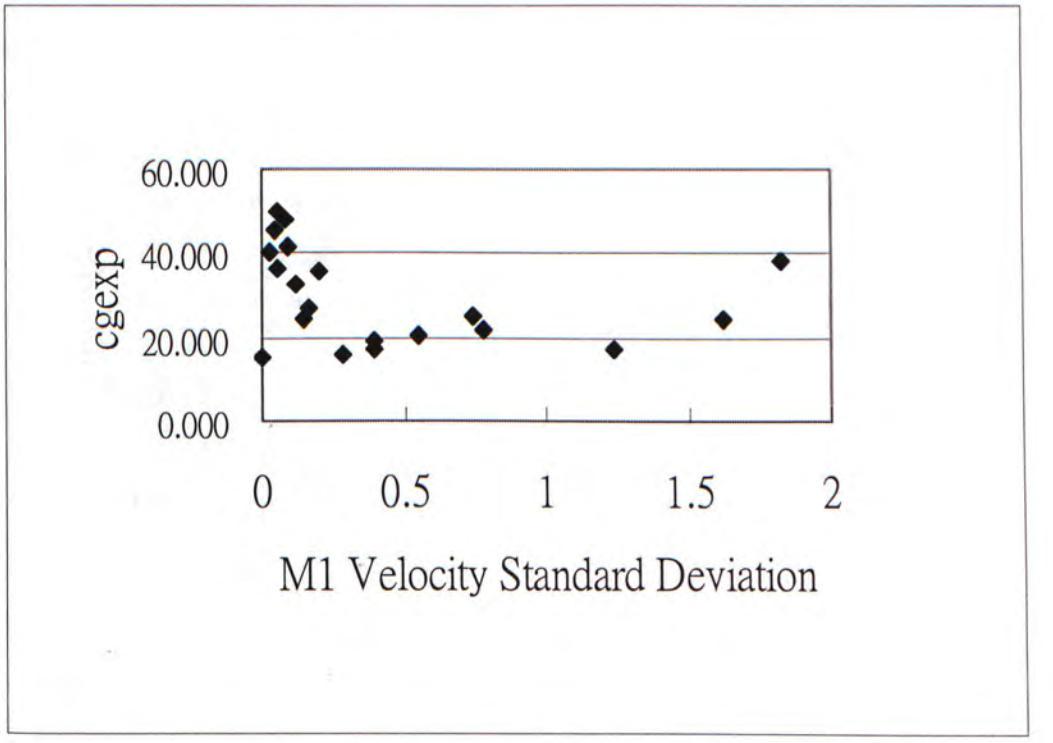

Figure 2.18.The relationship between M1 Velocity Standard Deviation and Central government expenditure as a percentage of GDP in the 90s

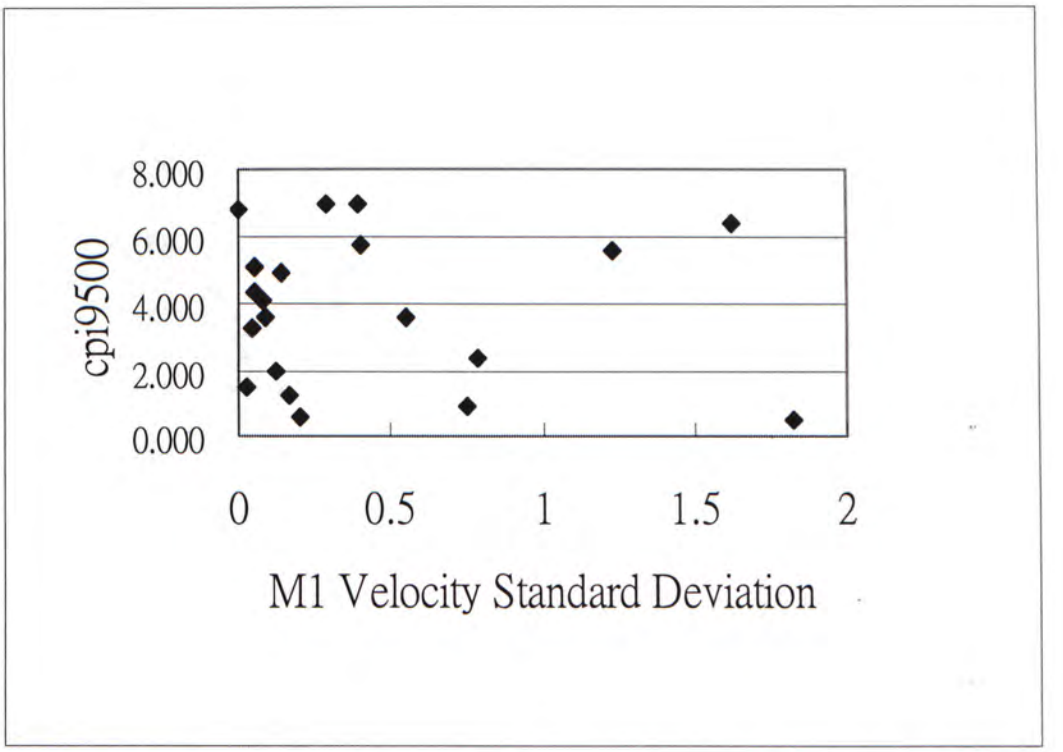

Figure 2.19.The relationship between M1 Velocity Standard Deviation and Corruption Perception Index in 90'

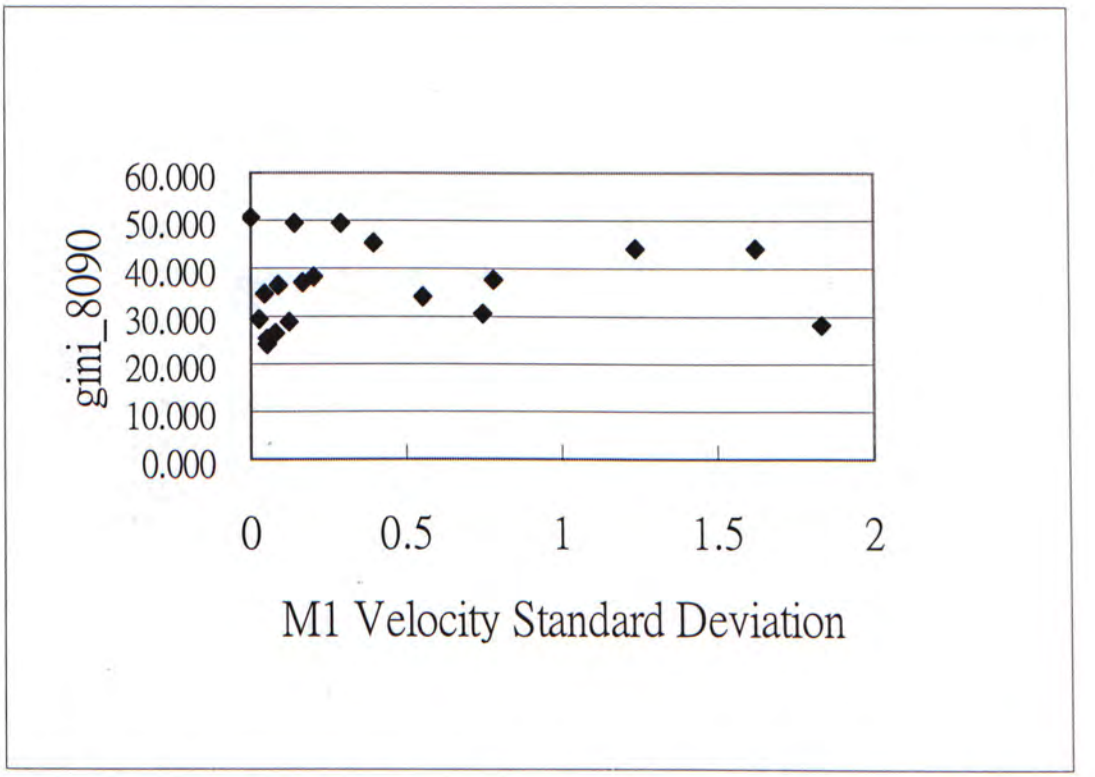

Figure 2.20.The relationship between M1 Velocity Standard Deviation and Gini index on income distribution in the 90s

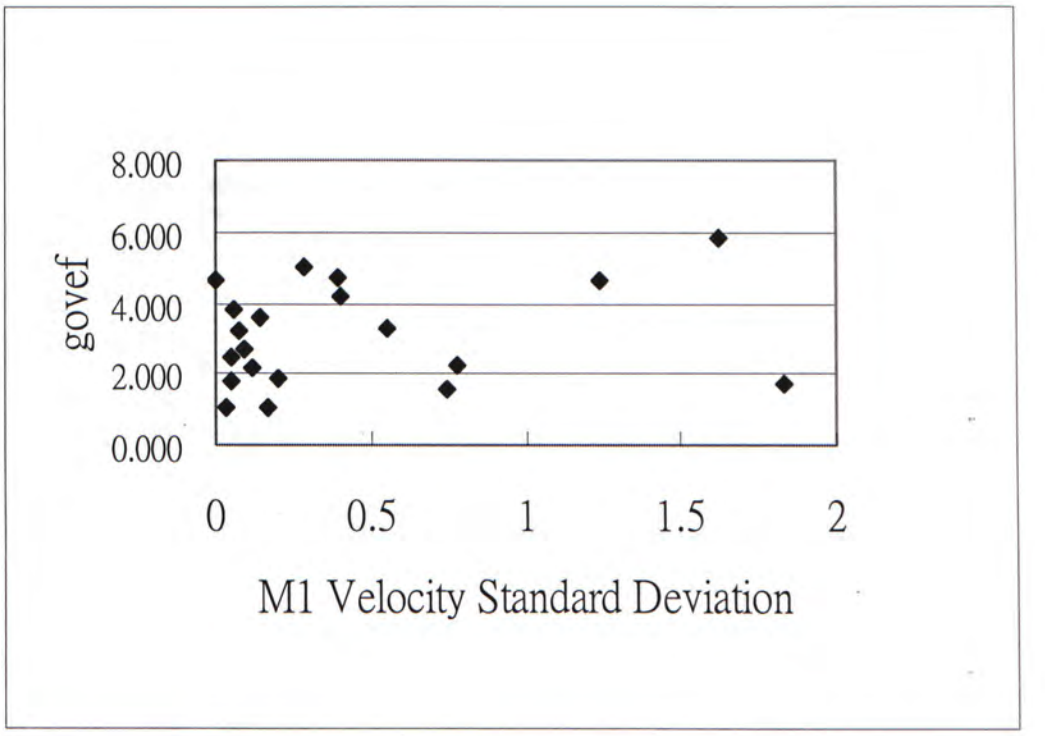

Figure 2.21.The relationship between M1 Velocity Standard Deviation and Government Effectiveness in the 90s

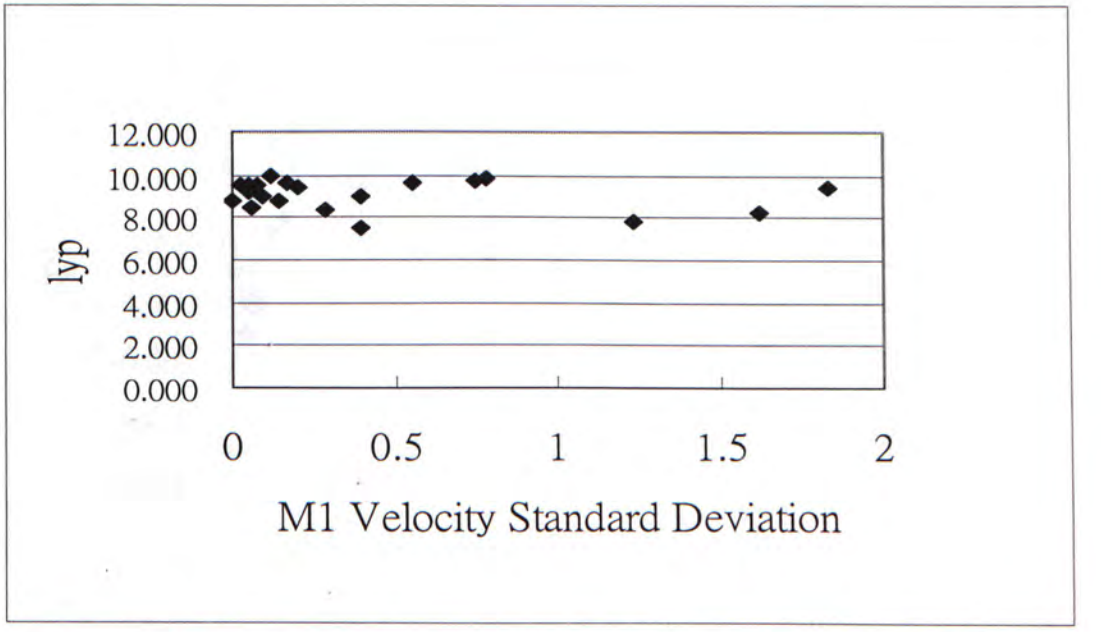

Figure 2.22.The relationship between M1 Velocity Standard Deviation and Natural log of per capita real GDP in the 90s

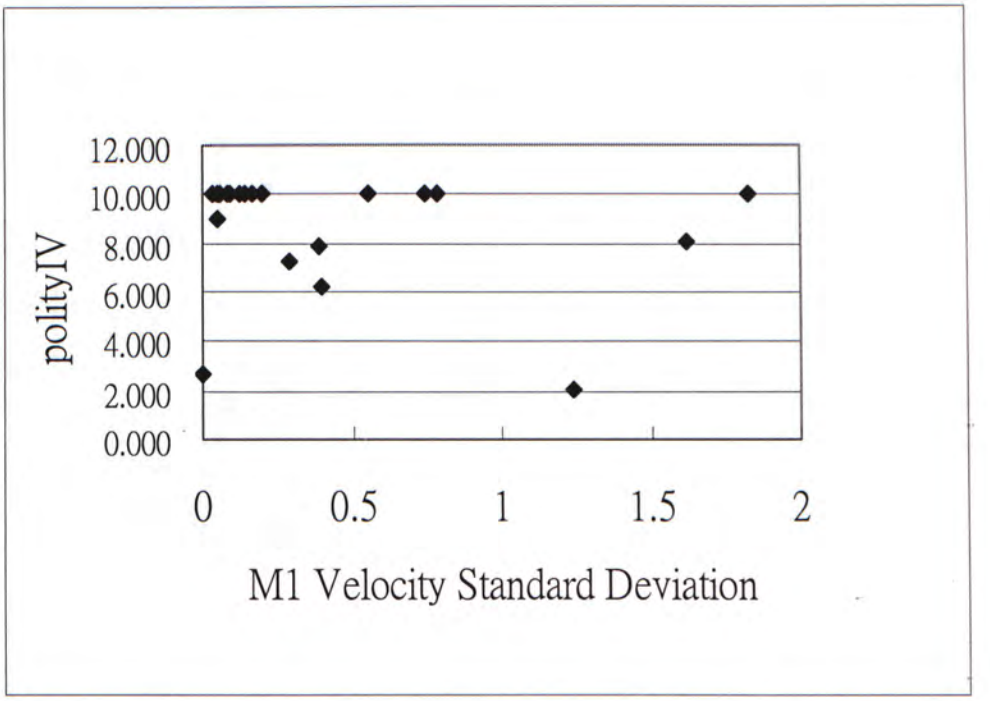

Figure 2.23.The relationship between M1 Velocity Standard Deviation and Score of democracy in 90'

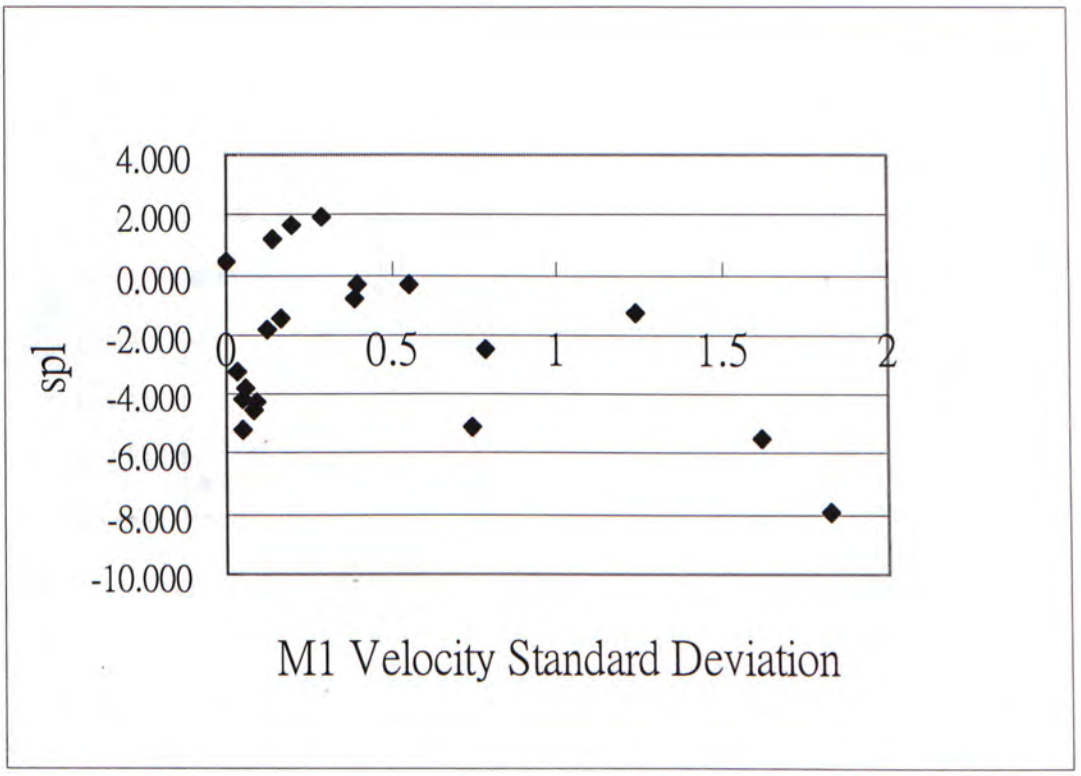

Figure 2.24.The relationship between M1 Velocity Standard Deviation and Central government budget surplus or deficit as a percentage of GDP in the 90s

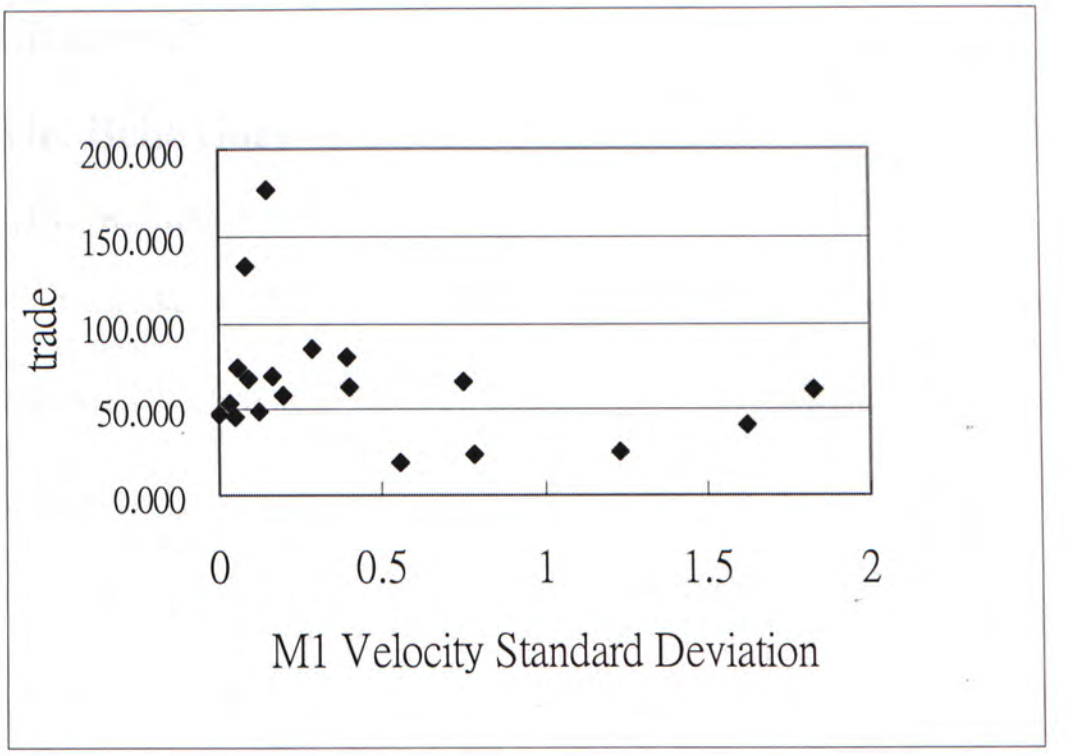

Figure 2.25.The relationship between M1 Velocity Standard Deviation and Sum of exports and imports of goods and services measured as a share of GDP in the 90s

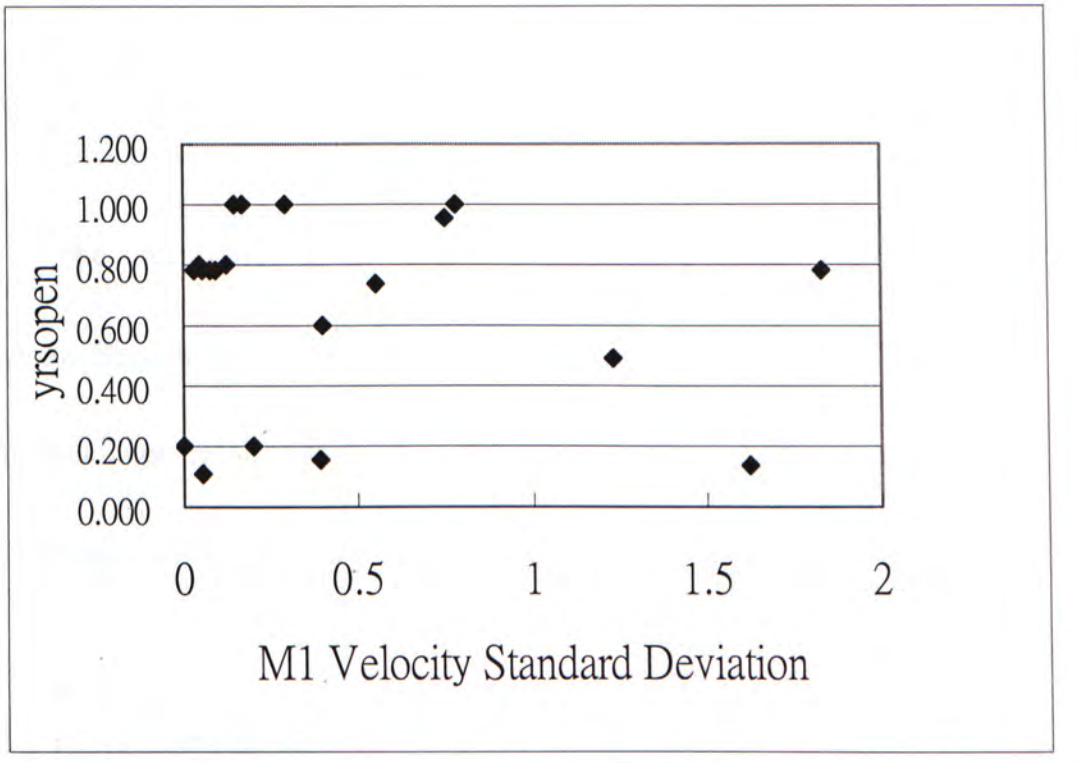

Figure 26.The relationship between M1 Velocity Standard Deviation and Index for openness to international trade in the 90s

Chapter 3

The Behaviors of Equity Premium

3.1 Introduction

Since the publication of Prescott and Mehra's (1986) work, more than a hundred articles have been published to explain the equity premium. In recent years, there is however some empirical works claiming that the equity premium is vanishing. Since the previous works are exclusively based on Western countries' data, this essay contributes to the literature by re-examining the debate with Western countries' as well as Asian countries' data. This paper computes the equity premium of 31 countries and 34 stock price series. Then, we will test the trends of the equity premium and investigate a number of economic variables to find out if they will contribute to the equity premium.

The organization of this section is as follows. Section 3.2 is the literature review. Section 3.3 provides a description of the data used. Section 3.4 discusses the methodology employed. Section 3.5 presents the empirical findings and the interpretations. Section 3.6 serves as a conclusion.

3.2 Literature Review

In the world's financial market, the most favorable investment instruments are stocks and fix-income security. A fix-income security holder will receive an interest

payment in each period. After setting the interest payment to the investment, the return of a fix-income security holder will be certain regardless of the economic situation is. However, the return of a stockholder varies with the stock price. As there is a higher risk in holding stocks, a stockholder could earn a higher return that a fix-income security holder.

The equity premium is the difference between the expected return of the market portfolio of common stocks and the risk-free interest rate which is important in portfolio allocation decisions, estimates of the cost of capital, the debate about the advantages of investing Social Security funds in stock, and many other applications. (Fama and French 2002)

In the past few years, there have been a lot of discussions on the equity premium. After the publication of Mehra and Prescott (1985), economists have become aware that there is a very big difference between the equity premium that is computed from the data, and that implied by the theory. Many explanations have been proposed by economists to explain such differences. The discussions on this topic are very vast and for convenience, it is often termed as "the equity premium puzzle." The equity premium puzzle means stock returns are seemingly too high given the observed volatility of consumption.

Historically, investors holding corporate equities have earned a premium, or an

extra return for holding equities instead of bonds which have more predictable returns. Estimates of this equity premium in the United States average around 4 percentage points for the past two centuries (Siegel 1998) and around 7 percentage points for the 1926–99 period (Center for Research in Security Prices).

The historical size of the U.S. equity premium has puzzled economists since the mid-1980s. Economists have assumed that the size of this premium is primarily a measure of the compensation that investors demand for taking an extra risk inherent in equity investments. But the standard asset pricing model which incorporates this assumption has not been able to account for an equity premium as large as 4 percentage points; with reasonable levels of risk aversion and other standard assumptions, the model predicts instead a premium around 0.25 of a percentage point (Mehra and Prescott 1985, Hansen and Jagannathan 1991). This discrepancy between data and theory has come to be known as the equity premium puzzle.

Economists have assumed that the size of the equity premium is mainly a measure of the compensation that investors demand for taking an extra risk inherent in equity investments. However, the data have shown us that other than inherent risks, there is still something determining the size of the equity premium. And these factors make the difference between the equity premium from the data and the theory. Kocherlakota (1996) suggested that the market imperfection is one of the

reasons for the differences. Market imperfections include information asymmetry and transaction costs. This reduces the willingness of an investor to bear a higher risk for a higher return.

If this is the reason for the large size of the equity premium in the mid-80s, the equity premium should have decreased in the recent years. It is because the information flow in the market has been improved. There are many works on the decline of equity premium in the past decade, including Blanchard (1993) as well as Fama and French (2001). They use the dividend growth rate, expected dividend yield to estimate the expected stock return, and hence the equity premium.

Fama and French (2002) suggested that the higher average return for 1951 to 2000 is due to a decline in discount rates which produces a large unexpected capital gain. Their main conclusion is that the average stock return of the last half-century is a lot higher than expected.

Jagnnathan, McGrattan and Scherbina (2000) demonstrate that the U.S. equity premium has declined significantly from averaged about 7 percentage points on average during 1926-1970 to only about 0.7 percentage point after that then. This result is shown to be reasonable by demonstrating the roughly equal returns that investments in stocks and bonds of the same duration would have been earned between 1982 and 1999, years when the equity premium was estimated to be around

zero.

Jagnnathan, McGrattan and Scherbina (2000) find that the U.S. equity premium has declined over the last three decades, confirming the results of other economists. However, they do not provide a definitive explanation for the recent premium decline. Much more work must be done to determine its cause and to build a full theory of asset pricing. Their work does, however, lead to a definite warning for inexperienced investors. If the recent decrease in the equity premium is due to the recent technological improvements—if some major market imperfections have been virtually eliminated—then the premium can be expected to stay at its current small size for the foreseeable future. Investors who rely on history to predict the returns they can expect from the stock market, therefore, are likely to be disappointed.

Fabio Canova and Gianni de Nicolo (2003) characterize the equity premium empirically in a number of industrialized countries for various subsamples starting in 1970. They showed that important instabilities emerge both across time and across countries. They highlighted that both the distribution of the risk-free rate and the equity premium display differences across countries and time periods, that the heterogeneities in the risk-free rate are linked to differences in inflation rates across time and countries, and that the differences in the equity premium are equally due to differences in the risk-free rate and in equity returns across countries and time. They

also show that the consumption-based CAPM model fails to account for the heterogeneities in the data. Hence, the discrepancy between the theory and the data is still large and more work needs to be done to explain the time-series patterns that emerge from stock and bond markets.

Martin Lettau, Sydney C. Ludvigson and Jessica A. Wachter (2004) ask whether the phenomenal surge in asset values that dominated the close of the 20th century can be plausibly described as a rational response to macroeconomic factors, namely the sharp and sustained decline in macroeconomic risk. They find that, in a large part, it can. In the model economy, a boom in stock prices occurs because the decline in macroeconomic risk leads to a fall in expected future stock returns, or the equity risk-premium. In our paper, we regress the equity premium with a number of macroeconomic variables and expect it may account for the equity premium in recent years.

Most of the work that has been done is based of the United States. They observe that the equity premium have been declining in the past few decades. They find that the premium averaged about 2 percentage points during 1970s and 1990s. At the end of 1999, the equity premium is about 1.26 percentage points. In this paper, we would focus on the situation of 31 countries and 34 stock price series. We calculate the equity premium for them and check if it shows a declining trend. We

also investigate if there is any economic variable contributing to the equity premium. Table 3.1 is the comparison of literature conclusions.

3.3 Data Description

Our research focuses on the examination of the time series properties of the equity premium in different countries and investigates the relationship between the equity premium and economic variables, such as the interest rate, the development stage of the economy and openness of a country. We will use RATS to examine the time series property.

We use the quarterly data obtained from the International Financial Statistics (IFS) by the International Monetary Fund (IMF) financial data, the data stream in the library of the Chinese University of Hong Kong and the economic variables were obtained from Persson and Tabellini (2003), whose observations are averaged over the period of 1990-98 (or the subperiod for which data are available) for a cross section of 85 countries. The definitions of the economic variables are shown at the Data Appendix. Table 3.2a is the data availability of fix-income security return and Table 3.2b shows the availability of the index data.

3.4 Methodology

The framework for this research is to examine the time series properties of the

equity premium in different countries and investigate the relationship between the equity premium and a number of economic variables.

In the following, we would derive a formula that we use to estimate the size of the equity premium at any particular time.

We calculate the equity premium at a given point in time as the difference between the stock yield and short term fix-income security return quarterly.

In particular, we define the equity premium r^{ep} at time t as

$$\sum r^{ep}_t = r^s_t - r^t_t \qquad (3.1)$$

In the above equation r^s_t is the stock yield while the r^t_t is the short term fix-income rate. The stock yield is calculated by calculating the quarterly return of the major stock index in respective countries. Whether we use Deposit rate, Money Market rate or Treasury bill rate as the short term fix-income rate in different countries depends on the availability in the International Financial Statistics.

The equity premium of different countries is plotted so that we can easily notice the trend of the equity Premium.

The tests we will use are as follows.

3.4.1 Unit root test

We use the augmented Dickey-Fuller (ADF) test to check for the presence of

unit roots. The ADF test is conducted from the ordinary least squares estimation. ADF test is also used to test for the stationarity of the time series data. The period which we test the equity premium of different countries is shown in Table 2a.

There are several ways to check for the stationarity of a time series. By definition, checking for the time-invariant mean, variance and all autocovariances, is not a practical method. Correlogram is a forthright tool to see if the auto-correlation diminishes as lag length increases, yet it is necessarily imprecise. Alternatively, testing the presence of unit roots is a much more formal way. The approach used in this study is the Augmented Dickey-Fuller (ADF) procedure (Dickey and Fuller, 1979, 1981), which is used to test the null hypothesis that a series does contain a unit root (i.e., it is nonstationary) against the alternative of no unit root (stationary series).

The following illustration begins with a first-order autoregressive process and the simple Dickey-Fuller test. Consider the AR(1) process $Y_t=\alpha_1 Y_{t-1} +\varepsilon_t$, where $\varepsilon_t \sim$ iid (0, σ2). Subtract yt-1 from both sides of the equation, the equivalent form is: $Y_t = \gamma Y_{t-1} + \varepsilon_t$, where $\gamma=\alpha_1 -1$. Thus, testing H0: $\alpha_1= 1$ against H1: $\alpha_1 < 1$ is simplified to a t-test with the null hypothesis $\gamma= 0$ against the alternative $\gamma< 0$. However, under non-stationarity, the statistic computed does not follow a standard t-distribution but, rather, a Dickey-Fullerτ-distribution constructed by Monte Carlo techniques.

It should be noted that there is no drift term (intercept) or deterministic trend in

that simplest form, yet these components are very sensitive to the validity of the unit root estimation. To be precise, Dickey and Fuller (1979, 1981) consider three different models:

$$\triangle Y_t = \gamma Y_{t-1} + \varepsilon_t \qquad (3.2)$$

$$\triangle Y_t = a_0 + \gamma Y_{t-1} + \varepsilon_t \qquad (3.3)$$

$$\triangle Y_t = a_0 + \gamma Y_{t-1} + \alpha_{12} t + \varepsilon_t \qquad (3.4)$$

(3.2) is a pure random walk, (3.3) is a random walk with a drift, and (3.4) is a random walk with both a drift and a deterministic trend. The parameter of interest in this study is gamma, regardless of which form is estimated; if $\gamma = 0$, the $\{Y_t\}$ sequence contains a unit root. Of course, for different forms, the critical values of the t-statistics are distinguished.

It is known that not all time series can be well represented by first-order autoregressive processes such as (3.2) ~ (3.4). If a simple AR (1) DF model is used when in fact Y_t follows an AR(p) process, then the error term will be autocorrelated, which violates the "white-noise" assumption, to compensate for the misspecification of the dynamic structure of Y_t.

To solve the problem, ADF test extends the model as follows:

$$\triangle Y_t = a0 + \gamma Yt\text{-}1 + \alpha_{12} t + \Sigma^{p}_{i=2} \beta_i \triangle Y_{t-1+i} + \varepsilon t$$

where $\gamma = -\{1 - \Sigma^{p}_{i=1} \alpha_i\}$

$$\beta = \sum^{p}_{i=1} \alpha_i \qquad (3.5)$$

Compared with the simple DF test, (3.5) adds lagged dependent variables $\sum^{p}_{i=2} \beta_i \triangle Y_{t-1+i}$ to capture the autocorrelated omitted variables that would otherwise, by default, enter the error term. Thus ADF test can be validly applied to the general process. However, it is important to select the appropriate lag-length; too few lags may result in over-rejecting the null when it is true (type I error), while too many lags may reduce the power of the test (i.e., 1 minus the probability of a type II error). Usually, Akaike information criterion (AIC) and Schwartz Bayesian criterion (SBC) are adopted to determine the suitable lag length.

3.4.2 General Statistics of equity premium

We show the general statistics of the equity premium, the mean, the standard deviation and the coefficient of variation of different countries. Coefficient of variation is a relative measure defined as the ratio of its standard deviation to its mean. We also show the effect of the development stage (developed and developing countries), currency zone (Euro and non-Euro zone) and geographical effect (Asian and non-Asian countries) on the equity premium. Table 3.3 shows the definition of the developed/developing countries based on the definition in the International Finance Statistics, Table 3.4 shows the definition of Euro/non-Euro zone and Table 3.5 shows the definition of Asian/non-Asian countries.

3.4.3 Relationship of equity premium and economic variables

We try to find out if there is any relationship between mean and standard deviation of the the 90s equity premium and a number of economic variables obtained from Persson and Tabellini (2003). The relationship is plotted and we regress the equity premium in the later part.

3.4.4 Country Regression

We regress the equity premium of different countries with a group of macroeconomic variables, such as the Gross Domestic Product (GDP) growth rate, the local short-term market rate, US 3-month inflation rate, income velocity of money; balance of payment variables; such as the current account balance, capital account balance and financial account balance; and the government budget surplus/deficit.

In our regression, the independent variables are stationary. If the independent variable is stochastic, we take the first difference to make it stationary. The stationarity of the independent variables can be referred to Table 3.6.

According to Lardaro (1993)[1], the Durbin-Watson test is used to test for the presence of autocorrelation. This test is valid when the following conditions are met: (i) the equation includes an intercept term; (ii) the error process is first-order

[1] Lardaro, Leonard, 1993 Applied Econometrics. HarperCollins College Publishers. Page 485

autoregressive; (iii) the equation excludes a lagged dependent variable; and (iv) none of the explanatory variables is stochastic. When the Durbin-Watson test is inconclusive, we add lagged independent variables to correct the problem of autocorrelation[1]. Then, we employ the Breusch-Godgrey test to ascertain the existence of autocorrelated errors. Breusch-Godgrey is a test which regress the OLS residuals on their own lags and the original regressor list. The strength of the Breusch-Godgrey test is that it has no inconclusive region. We use this test to compute the test of the null of no serial correlation in the error process.

We regress the equity premium with a number of variables. The regression is as follows:

$$\Delta ept_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt\ 1} + \sum_{n=1}^{n} \beta_n X_{nt\ 2} + \sum_{p=1}^{p} \beta_p X_{pt\ 3} + \varepsilon_t \qquad (3.6)$$

Where X=f(gdpg , v, ii, ir, ca, ka, fa, gb)

The independent variables we regress are as follows:

Independent Variables	
gdpg	It is the Gross Domestic Product Growth Rate of the country. It affects fiscal and monetary policy of the government which then affects the risk free rate and the return in the stock market.

[1] Lardaro, Leonard, 1993 Applied Econometrics. HarperCollins College Publishers. Page 491

v	It is the income velocity of money of the corresponding country. It is the average numbers of times that each dollar is used to make a payment for final output in a year. When it multiplies the money supply, it measures the value of purchases of final goods. It may affect the performance of stocks in the stock markets and then affect the equity premium.
ii	It is US 3-month Treasury Bill rate. US has strong influence over the world economy and which may affect the monetary policy of the other countries.
ir	It is the inflation rate of the corresponding country. It is an important factor which affects individual investment and consumption decision.
ca	It is the current account balance of the corresponding country. It affects the balance of payment and may affect the monetary policy.
ka	It is the capital account balance of the corresponding country. It affects the balance of payment and the economy of the country
fa	It is the financial account balance of the corresponding country. It affects the balance of payment and the economy of the country
gb	It is the government budget balance. It affects the monetary policy and affects individual investment and consumption decision.

3.4.5 Cross Country Regression

We have a cross-country regression to investigate the factors which may affect the equity premium in the 1990s. We regress the equity premium of different countries in the 90s with a group of macroeconomic variables to see if there are any variables to explain the equity premium in the decade.

We regress the equity premium with a number of economic variables. The regression is as follows:

$$\Delta ept_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt} + \varepsilon_t \qquad (3.7)$$

Where X=f(ir, cgexp, cpi9500, polityIV, yrsopen)

The independent variables we regress are as follows:

Independent Variables	
ir	It is the inflation rate
cgexp	It is the central government expenditure as a percentage of GDP
cpi9500	It is corruption perception index
polityIV	It is the score for democracy
yrsopen	It is the index for openness to international trade

3.5 Empirical Results

This part of the chapter presents, first, the empirical findings of the time series properties of the equity premium of different series. Second, it presents the general statistics of the equity premium and the effect of the development level (developed and developing countries), currency zone (Euro and non-Euro zone) and geographical effect (Asian and non-Asian countries) on the equity premium. Third, it presents the relationship between equity premium in the 1990s and a number of economic variables. Fourth, it presents the countries' equity premium regressions result. Fifth, it

presents the cross-country 90s' equity premium regression result. Finally, it is the chapter summary.

3.5.1 Time series properties of the equity premium

Figures 3.1a-3.1ag are the equity premium series of different countries. From the graph, we cannot notice any trend of the equity premium. Then, we do the unit root test to confirm our observation.

Table 3.7 is the unit root results of different equity premium series. From the table, we notice that all equity premium series are random walk. Therefore, we cannot notice any trend of the equity premium and also, the trend of the equity premium cannot be predicted. This is not the same as the results from other economists who show that the equity premium is vanishing. However, the different time period in testing the equity premium may account for the difference[1]. But this confirmed what Jagnnathan, McGrattan and Scherbina (2000) said, investors cannot rely on history to predict the returns they expect from the stock market.

3.5.2 Equity Premium general statistics

We would like to know the general statistics of the equity premium. Table 3.8a is

[1] For example, Jagnnathan, McGrattan and Scherbina (2000) test the period during 1926-1970 and Fama and French (2001) use the 1926-1999 period.

the equity premium of different countries. From the table, we notice that all the equity premiums show a negative mean, except for four countries (China-shanghai, France, Hong Kong and Peru). Table 3.8b is the equity premium general statistics in the 1990s. The results show the same result, only four countries (China-shanghai, France, Hong Kong and Peru) have a positive equity premium. Among these four countries, only France is a developed country and is in Euro zone. Therefore, we would like to know if the development level, currency zone and geographical effect could account for the equity premium.

Figure 3.2 shows the effect of the development level on equity premium mean. The patterns are very similar regardless of the country's status as being developed or developing. Figure 3.3 shows the effect of the development level on equity premium standard deviation. From the figure, we notice that developed countries tend to have a lower standard deviation than developing countries, which shows that the equity premium is more volatile in developing countries. Therefore, investors investing in developing countries have a higher risk.

Figure 3.4 shows the effect of the currency zone on equity premium. From the figure, it does not show any specific pattern and whether euro zone does affect the equity premium. Figure 3.5 shows the effect of the currency on equity premium standard deviation. It shows that it has lower equity premium standard deviation in

Euro Currency Zone.

Figure 3.6 shows the effect of the geography on equity premium. It has not much different between Asian and Non-Asian Countries. Figure 3.7 shows the effect of geography on equity premium standard deviation. It shows that Asian Countries tend to have higher equity premium standard deviation.

3.5.3 The relationship between the equity premium and economics variables

Figure 3.8 is the relationship between equity premium mean and its standard deviation. It does not show any special pattern.

Figure 3.9 is the relationship between equity premium Mean and the Age of democracy in the 90s. Both of them do not show clear relationship.

Figure 3.10 is the relationship between equity premium and the central government expenditure as a percentage of GDP in the 90s. It seems that when the central government expenditure as a percentage of GDP is higher, so is the equity premium. This is proved by the cross country regression in the later part.

Figure 3.11 is the relationship between equity premium mean and Corruption Perception Index in the 90s. Figure 3.12 is the relationship between equity premium mean and Gini index on income distribution in the decade. Figure 3.13 is the relationship between equity premium mean and government effectiveness in the 90s.

Figure 3.14 is the relationship between equity premium mean and Natural log of per capita real GDP in the 90s. All of them show no relationship pattern.

Figure 3.15 is the relationship between equity premium mean and the Score of democracy in the 90s. It showed that the score of democracy has an inverse relationship with the equity premium mean. The result is showed in the cross-country regression.

Figure 3.16 is the relationship between equity premium mean and Central government budget surplus or deficit as a percentage of GDP in the 90s. Figure 3.17 is the relationship between equity premium mean and the Sum of exports and imports of goods and services measured as a share of GDP in the 90s. Both of it showed no clear relationship.

Figure 3.18 is the relationship between equity premium mean and the Index for openness to international trade in the 90s. It showed that the higher the index for openness, the higher the equity premium. It is proved by the cross country regression in the later part.

Figure 3.19 is the relationship between equity premium standard deviation and the Age of democracy in the 90s. Figure 3.20 is the relationship between equity premium standard deviation and central government expenditure as a percentage of GDP in the 90s. Figure 3.21 is the relationship between equity premium standard

deviation and Corruption Perception Index in 90'. Figure 3.22 is the relationship between equity premium standard deviation and Gini index on income distribution in the 90s. Figure 3.23 is the relationship between equity premium standard deviation and Government Effectiveness in the 90s. Figure 3.24 is the relationship between equity premium standard deviation and Natural log of per capita real GDP in the 90s. Figure 3.25 is the relationship between equity premium standard deviation and Score of democracy in the 90s. Figure 3.26 is the relationship between equity premium standard deviation and Central government budget surplus or deficit as a percentage of GDP in the 90s. Figure 3.27 is the relationship between equity premium standard deviation and Sum of exports and imports of goods and services measured as a share of GDP in the 90s. Figure 3.28 is the relationship between equity premium standard deviation and Index for openness to international trade in the 90s. All figures do not show relationship of the variables and the equity premium standard deviation.

3.5.4 Country equity premium regression result

In this part, we regress the equity premium with the macroeconomic variables, balance of payment variables and the macroeconomic policies of equity premium series. Ten countries have no serial correlation. Table 3.9 is the regression result.

In this table, we find that the GDP growth rate, income velocity of money,

capital account balance, financial account balance and government budget balance have no effect on the equity premium. We find that the one period lagged US 3-month Treasury Bill rate has the same negative estimated effect -0.2 on US DJIA and US S&P500 equity premium.

The one period lagged inflation rate has negative effect on US DJIA and US S&P500 with an estimated effect is -5.41 and -5.04 respectively, yet it has positive effect on France's equity premium with an estimated effect 34.55. Fabio Canova and Gianni de Nicolo (2003) highlighted that the heterogeneities in the risk-free rate are linked to differences in inflation rates across time and countries. However, in our regression, inflation rate only has effect on the US and France equity premium.

The one period lagged capital account has positive effect on US S&P500 equity premium with an estimated effect 0.001.

In these regressions, there are no variables consistently significant for all equity premium series. We continue to do the cross country regression in the next session to investigate if any other variable has an effect on equity premium.

3.5.5 Cross Country regression result

We further check the effect of macroeconomics variables on equity premium in 1990s by cross country regression. Table 10 is the regression result and Table 3.11 is

the correlation coefficient of the variables in the regression.

In the regression, the inflation rate, central government expenditure, score for democracy and index for openness to international trade are statistically significant but the corruption perception index is statistically insignificant. R^2 indicates that around 63 percent of the variation in the equity premium can be explained by the independent variables.

We find that the inflation rate, central government expenditure as a percentage of GDP, index for openness to international trade have positive effect on the equity premium with an estimated effect 0.423, 0.002 and 0.044 respectively, but the score for democracy has negative effect on the equity premium with an estimated effect of -0.008.

When the country experiences inflation, which means the price of the goods is increasing, the price of stock will increase too. As a result, the stock price increases and the nominal expect return of the in stock market increases due to an increase in stock price. Hence, the equity premium increases as the stock market return increases. In this part, the result is the same as what Fabio Canova and Gianni de Nicolo (2003) proves. They highlighted that the heterogeneities in the risk-free rate are linked to differences in inflation rates across time and countries.

The cross country regression shows that the higher the central government

expenditure as a percentage of GDP, the higher the equity premium. We believe that when the central government expenditure is higher, the country has an expansionary fiscal policy which stimulates the economy. In this case, people have positive expectations about the economy of a country. Firms have higher revenues and investors have higher income to invest in the stock market. This leads to the rise of stock price and lead to higher nominal return in the stock market. Hence, it leads to higher equity premium.

The cross country regression also shows that the more open a country is to international trade, the higher the equity premium. As both countries benefit from international trade mutually, hence, the more open country is to international trade, the more benefit the country has and the higher GDP growth rate it gets. This is reflected by the rise of stock price and the nominal stock return. As a result, it has a higher equity premium. In the wake of globalization and advocacy of free trade, we believe the degree of international trade between countries is becoming higher and higher, it may be the reason that makes the difference between the equity premium from the data and the theory.

Inflation rate and central government expenditure is changing from period to period and do not show trends. Hence, it is not a reason accounting for the vanishing of equity premium.

The result showed that the higher the score of democracy, the lower the equity premium. A higher score for democracy means a more democratic country. Conversely, the lower the score a country has, the more autocratic the country is. We believe that in more autocratic countries, investors feel they are exposed to a higher risk of investment and require higher premium for the risk they face. As a result, the equity premium is higher in an autocratic country. This may be the reason for the decrease of the equity premium.

3.5.6 Chapter Summary

We find that all equity premiums have random walk properties. We also find that most of the equity premiums are negative. Developing countries, Non-Euro currency zone countries and Asian countries tend to have a higher equity premium standard deviation, which shows that their equity premium is more volatile. From the cross country regression, we find that the higher the inflation rate, central government expenditure, openness to international trade and the more autocratic the country, the higher the equity premium.

Hence, investors cannot predict the future equity premium by studying the history of it. They should bear in mind that that the equity premium in many countries show a negative mean, it is not 100% true that they can earn higher return in stock

market compared with fix income security. This confirms other economists' suggestion that the stock return is almost indifferent to the fix income security return. Investors should also be aware that they need to require a higher equity premium if the country is more autocratic, more open to international trade, having higher inflation rate, and higher central government expenditure as a percentage of GDP.

3.6 Conclusion

Our research focuses on the time series properties of the equity premium and the relationship between the equity premium and a number of economic factors. The empirical results obtained here shows first, all equity premium series are random walk which shows no trends and cannot be predicted. Second, most equity premiums show negative means which show that the stock return is almost indifferent and maybe inferior to the return of fix income security. Third, developing countries', Non-Euro currency zone countries' and Asian countries' equity premiums have a higher standard deviation. Fourth, the country has a higher equity premium if the country is more autocratic, more open to international trade, having higher inflation rate, and higher central government expenditure as a percentage of GDP.

Our results confirm the suggestions by Jagnnathan, McGrattan and Scherbina (2000) that investors cannot rely on history to predict the returns they can expect

from the stock market.

The empirical evidence obtained here prove that inflation rate, the amount of central government expenditure, the degree of openness to international trade and democratic level of a country have an effect on the equity premium.

Author	Conclusion
Matin Lettau, Sydney C. Ludvigson, Jessica A. Wachter	1. The surge in asset values that dominated the close of the 20th century can be plausibly described as a rational response to macroeconomic factors, namely the sharp and sustained decline in macroeconomic risk. 2. The decline in macroeconomic risk leads to a fall in expected future stock returns, or the equity premium
Fama and French	1. The high return for 1951 to 2000 seems to be the result of low expected future returns 2. The unconditional expected equity premium of the last 50 years is probably far below the realized premium
Jagannathan, McGrattan, Scherbina	1. Institutional changes have occurred in the United States that would result in a permanent shift in stock returns
Mehra and Prescott	1. The equity premium puzzle may not be why was the average equity return so high but rather why was the average risk-free rate so low.
Canova and Gianni	1. There are important instability emerge both across time and across countries. 2. Consumption-based CAPM model fails to account for the heterogeneities.

Table 3.1: Summary table of the literature (Comparison of conclusion)

COUNTRY	QUARTERLY	DEPOSITE RATE	MONEY MARKET RATE	TREASURY BILL RATE
Belgium	90Q2-03Q1			*
Brazil	95Q1-03Q1			*
Canada	69Q2-03Q1			
China-Shanghai	92Q2-03Q1			*
China-Shenzhen	93Q1-03Q1	*		
Finland	87Q2-03Q1	*		
France	87Q1-03Q1			*
Germany	75Q3-03Q1			*
Greece	89Q1-03Q1			*
Hong Kong	92Q4-03Q1			*
Hungary	91Q2-03Q1			*
India	87Q2-98Q1		*	
Indonesia	83Q3-03Q1			*
Ireland	83Q2-98Q4		*	
Italy	77Q1-03Q1			*
Japan	57Q1-03Q1		*	
Korea	76Q4-03Q1		*	
Malaysia	80Q2-03Q1			*
Mexico	88Q2-03Q1			*
Netherlands	83Q2-98Q4		*	
New Zealand	90Q2-03Q1			*
Peru	91Q2-03Q1		*	
Philippines	86Q2-03Q1			*
Portugal	93Q2-00Q1		*	
Singapore	85Q2-03Q1			*
Spain-IBEX35I	87Q2-03Q1			*
Spain-Madridi	79Q1-03Q1			*
Sweden	80Q2-01Q3			*
Switzerland	88Q4-03Q1			*
Thailand	77Q1-03Q1		*	
Turkey	88Q2-03Q1	*		
UK	62Q3-03Q1			*
US-DJIA	51Q2-03Q1			*
US-S&P Comp	65Q2-03Q1			*

Table 3.2a: Summary of country's fix-income rate data

Country	Name	Code	Period
Belgium	BEL 20 - PRICE INDEX	BGBEL20	1990Q2-2003Q3
Brazil	BRAZIL BOVESPA - PRICE INDEX	BRBOVES	1990Q2-2003Q3
Canada	S&P/TSX COMPOSITE INDEX - PRICE INDEX	TTOCOMP	1969Q2-2003Q3
China-Shanghai	SHANGHAI SE A SHARE - PRICE INDEX	CHSASHR	1992Q2-2003Q3
China-Shenzhen	SHENZHEN SE A SHARE - PRICE INDEX	CHZASHR	1993Q1-2003Q3
Finland	HEX GENERAL - PRICE INDEX	HEXINDX	1987Q2-2003Q3
France	CAC 40	FCAC40C	
Germany	DAX 30 PERFORMANCE - PRICE INDEX	DAXINDX	1965Q2-2003Q3
Greece	ATHENS SE GENERAL 'e' - PRICE INDEX	GRAGENL	1989Q1-2003Q3
Hong Kong	HANG SENG INDEX	HNGKNGI	1963Q3-2003Q3
Hungary	BUDAPEST (BUX) - PRICE INDEX	BUXINDX	1991Q2-2003Q3
India	INDIA BSE NATIONAL - PRICE INDEX	IBOMBSE	1987Q2-2003Q3
Indonesia	JAKARTA SE COMPOSITE - PRICE INDEX	JAKCOMP	1983Q3-2003Q3
Ireland	IRELAND SE OVERALL (ISEQ) - PRICE INDEX	ISEQUIT	1983Q1-2003Q3
Italy	MILAN COMIT GENERAL - PRICE INDEX	MILANBC	1969Q2-2003Q3
Japan	Nikkei 225	JAPDOWA	1950Q3-2003Q3
Korea	KOREA SE COMPOSITE (KOSPI) - PRICE INDEX	KORCOMP	1975Q2-2003Q3
Malaysia	KUALA LUMPUR COMPOSITE - PRICE INDEX	KLPCOMP	1980Q2-2003Q3
Mexico	MEXICO IPC (BOLSA) - PRICE INDEX	MXIPC35	1988Q2-2003Q3
Netherland	AEX INDEX (AEX) - PRICE INDEX	AMSTEOE	1988Q2-2003Q3
New Zealand	NZSX CAPITAL 40 - PRICE INDEX	NZ40CAP	1990Q2-2003Q3

Peru	LIMA SE GENERAL(IGBL) - PRICE INDEX	PEFENRL	1991Q2-2003Q3
Philippine	PHILIPPINES SE COMPOSITE - PRICE INDEX	PSECOMP	1986Q2-2003Q3
Portugal	PORTUGAL PSI - 20	POPS120	1993Q2-2003Q3
Singapore	SINGAPORE STRAITS TIMES(NEW) - PRICE INDEX	SNGPORI	1985Q2-2003Q3
Spain-IBEX35I	IBEX 35 - PRICE INDEX	IBEX35I	1987Q2-2003Q3
Spain-Madrid	Madrid SE	MADRIDI	1974Q2-2003Q3
Sweden	AFFARSVARLDEN GENERAL INDEX - PRICE INDEX	AFFGENL	1980Q2-2003Q3
Switzerland	SWISS MARKET - PRICE INDEX	SWISSMI	1988Q4-2003Q3
Taiwan	TAIWAN SE WEIGHTED - PRICE INDEX	TAIWGHT	1971Q2-2003Q3
Thailand	BANGKOK S.E.T. - PRICE INDEX	BNGKSET	1975Q4-2003Q3
Turkey	ISE NATIONAL 100 - PRICE INDEX	TRKISTB	1988Q2-2003Q3
UK	FTSE ALL SHARE - PRICE INDEX	FTALLSH	1962Q3-2003Q3
US-S&P Comp	S&P 500 COMPOSITE - PRICE INDEX	S&PCOMP	1965Q2-2003Q3
US-DJIA	DJIA	DJINDUS	1951Q2-2003Q3

Table 3.2b: Summary of country's Index data

COUNTRY	DEVELOPED COUNTRY	DEVELOPING COUNTRY
Belgium	*	
Brazil		*
Canada	*	
China		*
Finland	*	
France	*	
Germany	*	
Greece	*	
Hong Kong	*	
Hungary		*
India		*
Indonesia		*
Ireland	*	
Italy	*	
Japan	*	
Korea		*
Malaysia		*
Mexico		*
Netherlands	*	
New Zealand	*	
Peru		*
Philippines		*
Portugal	*	
Russia		*
Singapore		*
Spain	*	
Sweden	*	
Switzerland	*	
Thailand		*
Turkey		*
United Kingdom	*	
United States	*	

Table 3.3: Developed/Developing Country

COUNTRY	EURO COUNTRY	NON EURO COUNTRY
Belgium	*	
Brazil		*
Canada		*
China		*
Finland	*	
France	*	
Germany	*	
Greece	*	
Hong Kong		*
Hungary		*
India		*
Indonesia		*
Ireland		*
Italy	*	
Japan		*
Korea		*
Malaysia		*
Mexico		*
Netherlands	*	
New Zealand		*
Norway		*
Peru		*
Philippines		*
Portugal	*	
Singapore		*
Spain	*	
Sweden		*
Switzerland		*
Thailand		*
Turkey		*
United Kingdom		*
United States		*

Table 3.4: Euro Country and non-Euro Country

COUNTRY	ASIAN COUNTRY	NON ASIAN COUNTRY
Belgium		*
Brazil		*
Canada		*
China	*	
Finland		*
France		*
Germany		*
Greece		*
Hong Kong	*	
Hungary		*
India	*	
Ireland		*
Italy		*
Japan	*	
Korea	*	
Malaysia	*	
Mexico		*
Netherlands		*
New Zealand		*
Peru		*
Philippines	*	
Portugal		*
Singapore	*	
Spain		*
Sweden		*
Switzerland		*
Thailand	*	
Turkey		*
United Kingdom		*
United States		*

Table 3.5: Asian Country and non-Asian Country

Country	t	ep	gdpg	pr	v	i	ir	ca	ka	fa	gb
Brazil	1	N	N	N	N	1	0	1	1	0	0
Canada	1	N	N	N	1	1	0	0	0	0	0
France	1	N	N	N	1	1	0	0	0	0	0
Germany	1	N	N	N	1	1	0	0	0	0	0
Hungary	1	N	N	N	N	1	0	0	1	0	0
Italy	1	N	N	N	1	1	0	0	0	0	0
Korea	1	N	N	N	N	1	0	0	0	0	0
Peru	N	N	N	N	1	1	0	0	0	0	0
Spain-IBEX35I	1	N	N	N	1	1	0	0	0	0	0
UK	1	N	N	N	N	1	1	0	1	0	0
US-DJIA	N	N	N	N	1	1	0	0	0	0	0
US-S&P Comp	1	N	N	N	1	1	0	0	0	0	0

Table 3.6: Stationary of the series,

N: stationary

1: I(1)

General equation: $\triangle Y_{t=} a_0 + \alpha t + \gamma Y_{t-1} + \beta_1 \triangle Y_{t-1} + \beta_2 \triangle Y_{t-2} + \varepsilon_t$

Country	a_0	α	γ	β_1	β_2	Conclusion
Belgium			-0.832			Random Walk
			(-6.01729)**			
Brazil			-0.876			Random Walk
			(-5.25585)**			
Canada			-0.625			Random Walk
			(-7.81930)**			
China-shanghai			-1.256			Random Walk
			(-8.49673)**			
China-shenzhen			-0.971			Random Walk
			(0.00000031)**			
Finland			-0.785			Random Walk
			(-6.29559)**			
France			-0.627			Random Walk
			(-4.46399)**			
Germany			-0.703			Random Walk
			(-7.61032)**			
Greece			-0.944			Random Walk
			(-7.07149)**			
Hong Kong			-1.204			Random Walk
			(-7.78235)**			

Hungary	-0.934	Random Walk
	(-6.34595)**	
India	-1.017	Random Walk
	(-6.48979)**	
Indonesia	-0.850	Random Walk
	(-7.57688)**	
Ireland	-0.909	Random Walk
	(-7.03449)**	
Italy	-0.749	Random Walk
	(-7.84019)**	
Japan	-0.736	Random Walk
	(-10.34222)**	
Korea	-0.654	Random Walk
	(-7.09398)**	
Malaysia	-0.845	Random Walk
	(-8.11692)**	
Mexico	-0.987	Random Walk
	(-7.57139)**	
Netherlands	-1.004	Random Walk
	(-7.55950)**	
New Zealand	-0.788	Random Walk
	(-5.94825)**	

Peru	-0.742	Random Walk
	(-5.26801)**	
Philippines	-0.919	Random Walk
	(-7.51178)**	
Portugal	-0.702	Random Walk
	(-3.25954)**	
Singapore	-0.971	Random Walk
	(-8.12573)**	
Spain-IBEX35I	-0.824	Random Walk
	(-6.66623)**	
Spain-Madridi	-0.725	Random Walk
	(-7.48699)**	
Sweden	-0.754	Random Walk
	(-7.13181)**	
Switzerland	-0.910	Random Walk
	(-6.74356)**	
Thailand	-0.717	Random Walk
	(-7.58819)**	
Turkey	-0.928	Random Walk
	(-7.18025)**	
UK	-0.790	Random Walk
	(-10.20026)**	

US-DJIA	-0.600 (-9.38856)**	Random Walk
US-S&P Comp	-0.544 (-7.48050)**	Random Walk

Table 3.7: Equity Premium unit root result

Inside the blanket is the t-statistics

* Indicate statistical significance at one percent level, for a one tail test

** Indicate statistical significance at five percent level, for a one tail test

Country	Mean	Variance	Standard Deviation	Coefficient of variation
Belgium	-0.04593	0.009581	0.097883	-2.13115
Brazil	-0.07033	0.035941	0.189582	-2.69576
Canada	-0.06513	0.009042	0.095092	-1.45997
China Shanghai	0.044371	0.183823	0.428746	9.662673
China Shenzhen	-0.01419	0.057426	0.239638	-16.8907
Finland	-0.02642	0.034126	0.184731	-6.99209
France	0.029388	0.128315	0.35821	12.18884
Germany	-0.05608	0.012236	0.110615	-1.97248
Greece	-0.02918	0.052067	0.228183	-7.82087
Hong Kong	0.012355	0.027638	0.166247	13.45583
Hungary	-0.02994	0.040244	0.20061	-6.70094
India	-0.02731	0.038093	0.195175	-7.14642
Indonesia	-0.06015	0.044657	0.211322	-3.51349
Ireland	-0.03218	0.016849	0.129804	-4.03384
Italy	-0.05625	0.020277	0.142398	-2.5317
Japan	-0.05034	0.010234	0.101165	-2.00953
Korea	-0.06875	0.024624	0.15692	-2.28241
Malaysia	-0.04895	0.025539	0.159809	-3.26451
Mexico	-0.03335	0.024786	0.157434	-4.72062
Netherlands	-0.03036	0.014785	0.121596	-4.00518
New Zealand	-0.0573	0.008895	0.094314	-1.64593
Peru	0.000579	0.045203	0.21261	367.2181
Philippines	-0.03022	0.052102	0.228259	-7.55318
Portugal	-0.01928	0.010701	0.103445	-5.3645
Singapore	-0.0346	0.02094	0.144706	-4.18192
Spain IBEX	-0.04925	0.013552	0.116412	-2.36391
Spain Madridi	-0.0578	0.016763	0.129472	-2.24002
Sweden	-0.03803	0.016102	0.126895	-3.33678
Switzerland	-0.0333	0.009913	0.099562	-2.99014
Thailand	-0.06088	0.029456	0.171629	-2.81915
Turkey	-0.02629	0.183381	0.42823	-16.2898
UK	-0.05702	0.012463	0.111637	-1.95787
US DJIA	-0.04487	0.006847	0.082747	-1.84404
US S&PCOMP	-0.05909	0.006457	0.080355	-1.35986

Table 3.8a: Equity Premium General Statistics

Country's 90's data	Mean	Variance	Standard Deviation	Coefficient of variation
Belgium	-0.04593	0.009581	0.097883	-2.13115
Brazil	-0.07033	0.035941	0.189582	-2.69576
Canada	-0.04469	0.007073	0.084101	-1.88183
China Shanghai	0.044371	0.183823	0.428746	9.662673
China Shenzhen	-0.01419	0.057426	0.239638	-16.8907
Finland	-0.0211	0.038157	0.195337	-9.25618
France	0.021308	0.144098	0.379603	17.81476
Germany	-0.03691	0.014627	0.120942	-3.27701
Greece	-0.03297	0.05211	0.228276	-6.92382
Hong Kong	0.012355	0.027638	0.166247	13.45583
Hungary	-0.02994	0.040244	0.20061	-6.70094
India	-0.0203	0.046702	0.216107	-10.6474
Indonesia	-0.07439	0.036984	0.192312	-2.58519
Ireland	-0.03565	0.014761	0.121494	-3.40806
Italy	-0.04626	0.017432	0.132029	-2.85396
Japan	-0.07027	0.011046	0.105101	-1.49565
Korea	-0.065	0.031457	0.17736	-2.72876
Malaysia	-0.03968	0.022152	0.148836	-3.75093
Mexico	-0.03324	0.025988	0.161207	-4.84949
Netherlands	-0.02173	0.01277	0.113003	-5.1992
New Zealand	-0.0573	0.008895	0.094314	-1.64593
Peru	0.000579	0.045203	0.21261	367.2181
Philippines	-0.06531	0.033354	0.18263	-2.79616
Portugal	-0.01928	0.010701	0.103445	-5.3645
Singapore	-0.03532	0.017264	0.131391	-3.72026
Spain IBEX	-0.04354	0.013931	0.118028	-2.71066
Spain Madridi	-0.04279	0.013244	0.115084	-2.68955
Sweden	-0.03314	0.017416	0.131968	-3.98178
Switzerland	-0.02982	0.0101	0.100499	-3.37016
Thailand	-0.05771	0.034863	0.186716	-3.23533
Turkey	-0.02555	0.176501	0.420121	-16.446
UK	-0.04874	0.005792	0.076108	-1.56144
US DJIA	-0.03076	0.004639	0.068108	-2.21448
US S&PCOMP	-0.0344	0.004727	0.068751	-1.9987

Table 3.8b: the 90s Country's Equity Premium Statistics Summary

General equation: $\Delta ept_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt\ 1} + \sum_{n=1}^{n} \beta_n X_{nt\ 2} + \sum_{p=1}^{p} \beta_p X_{pt\ 3} + \varepsilon_t$

Where X=f(gdpg , v, ii, ir, ca, ka, fa, gb)

Equity Premium	Brazil	Canada	France	Germany	Hungary	Peru	Spain	UK	US DJIA	US S&P 500
$gdpg_{t-1}$	-0.94	2.52	3.04	-0.18	2.09	1.08	-1.19	-1.41	-0.42	0.0002
	(-1.06)	(1.27)	(0.41)	(-0.17)	(2.01)	(1.43)	(-0.62)	(-0.57)	(-0.39)	(1.16)
v_{t-1}	-0.01	-0.07	0.88	0.76	-2.19	-0.62	-0.49	0.65	0.76	0.47
	(-0.44)	(-0.16)	(0.23)	(1.06)	(-1.38)	(-1.22)	(-0.94)	(0.54)	(1.47)	(0.88)
ii_{t-1}	0.59	-0.22	0.52	-0.04	-0.04	0.20	0.05	-0.16	**-0.20**	**-0.20**
	(1.88)	(-2.06)	(1.11)	(-0.44)	(-0.12)	(0.85)	(0.24)	(-0.93)	**(-3.11)***	**(-3.28)***
ir_{t-1}	7.54	-1.5	**34.55**	-2.19	8.18	-0.18	-1.54	0.001	**-5.41**	**-5.04**
	(1.63)	(-0.57)	**(2.21)***	(-0.91)	(1.62)	(-0.11)	(-0.37)	(0.11)	**(-4.42)***	**(-4.42)***
ca_{t-1}	0.02	0.00002	0.02	-0.001	-0.00001	0.0001	0.00003	0.0003	0.0007	**0.001**
	(0.22)	(0.25)	(1.44)	(-0.37)	(-0.07)	(1.28)	(0.33)	(0.08)	(1.62)	**(1.99)***
ka_{t-1}	0.05	0.00002	-0.03	-0.05	-0.06	0.005	0.00005	0.04	-0.01	-0.01
	(0.93)	(0.58)	(-0.79)	(-1.37)	(-1.76)	(1.52)	(1.77)	(0.44)	(-0.69)	(-1.15)
fa_{t-1}	-0.00002	0.00003	-0.01	-0.0007	0.00003	-0.00007	-0.00002	-0.0008	0.0001	0.0001
	(-0.35)	(0.53)	(-1.57)	(-0.47)	(-0.50)	(-0.89)	(-0.55)	(-0.48)	(0.48)	(0.35)
gb_{t-1}	-0.03	-0.01	0.001	-0.004	0.52	-0.0008	-0.002	-0.004	0.002	0.008
	(-1.15)	(-0.30)	(0.23)	(-0.39)	(0.30)	(-0.07)	(-0.36)	(-0.73)	(0.21)	(0.83)
$gdpg_{t-2}$		-2.50	-4.40	-1.31		1.05				
		(-1.16)	(-0.60)	(-1.59)		(1.52)				

v_{t-2}		-0.14			0.78	-0.70	
		(-0.32)			(0.63)	(-1.47)	
ii_{t-2}		0.004	-0.55	-0.09			
		(0.03)	(-1.11)	(-0.90)			
ir_{t-2}		-1.01		-2.33			-0.01
		(-0.39)		(-0.96)			(-0.63)
ca_{t-2}	-0.11	0.00004					
	(-0.85)	(0.42)					
ka_{t-2}		-0.00001					
		(-0.28)					
fa_{t-2}		-0.00002					
		(-0.29)					
gb_{t-2}	0.01	-0.01					
	(0.57)	(-0.33)					
$gdpg_{t-3}$							
v_{t-3}							
ii_{t-3}		0.09					
		(0.85)					
ir_{t-3}							
ca_{t-3}							

ka_{t-3}										
fa_{t-3}										
gb_{t-3}										
Constant	-0.02	-0.06	-0.20	-0.007	1.61	0.07	-0.04	-0.05	0.02	-0.001
	(-0.13)	(-0.6)	(-1.49)	(-0.20)	(1.01)	(0.67)	(-0.59)	(-0.73)	(0.87)	(-0.02)
DW	2.09	1.80	2.00	1.72	2.02	2.09	1.99	2.13	2.00	2.09

Table 3.9: Equity Premium regression result.

*95%significant level

General equation: $\Delta ept_t = a_0 + \sum_{m=1}^{m} \beta_m X_{mt} + \varepsilon_t$

Where X=f(ir, cgexp, cpi9500, polityIV, yrsopen)

equity premium	constant	ir	cgexp	cpi9500	polityIV	yrsopen
Coefficient	-0.039	0.423	0.002	-0.004	-0.008	0.044
t-statistics	(-1.59)	(-3.04)*	(-3.87)*	(-1.76)	(-3.68)*	(-3.29)*

R^2	0.6305
Adjusted R^2	0.5218
Ramsey test	No omitted variables
Cook-Weisberg Test	No heteroskedasticity
Prob > F	0.026

Table 3.10: regression of the the 90s equity premium mean with different economics variables

*95%significant level

		EPT	IR	CGEXP	CPI9500	POLITYIV	YRSOPEN
EPT	Pearson Correlation	1	.204	.286	-.182	-.148	.168
	Sig. (2-tailed)	.	.350	.186	.406	.500	.443
	N	23	23	23	23	23	23
IR	Pearson Correlation	.204	1	-.217	.497(*)	-.426(*)	-.572(**)
	Sig. (2-tailed)	.350	.	.321	.016	.043	.004
	N	23	23	23	23	23	23
CGEXP	Pearson Correlation	.286	-.217	1	-.371	.561(**)	-.021
	Sig. (2-tailed)	.186	.321	.	.081	.005	.926
	N	23	23	23	23	23	23
CPI9500	Pearson Correlation	-.182	.497(*)	-.371	1	-.608(**)	-.490(*)
	Sig. (2-tailed)	.406	.016	.081	.	.002	.018
	N	23	23	23	23	23	23
POLITYIV	Pearson Correlation	-.148	-.426(*)	.561(**)	-.608(**)	1	.406
	Sig. (2-tailed)	.500	.043	.005	.002	.	.054
	N	23	23	23	23	23	23
YRSOPEN	Pearson Correlation	.168	-.572(**)	-.021	-.490(*)	.406	1
	Sig. (2-tailed)	.443	.004	.926	.018	.054	.
	N	23	23	23	23	23	23

Table 3.11: Correlation Coefficient of the variables in the regression of the the 90s equity premium mean with different economics variables

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed)

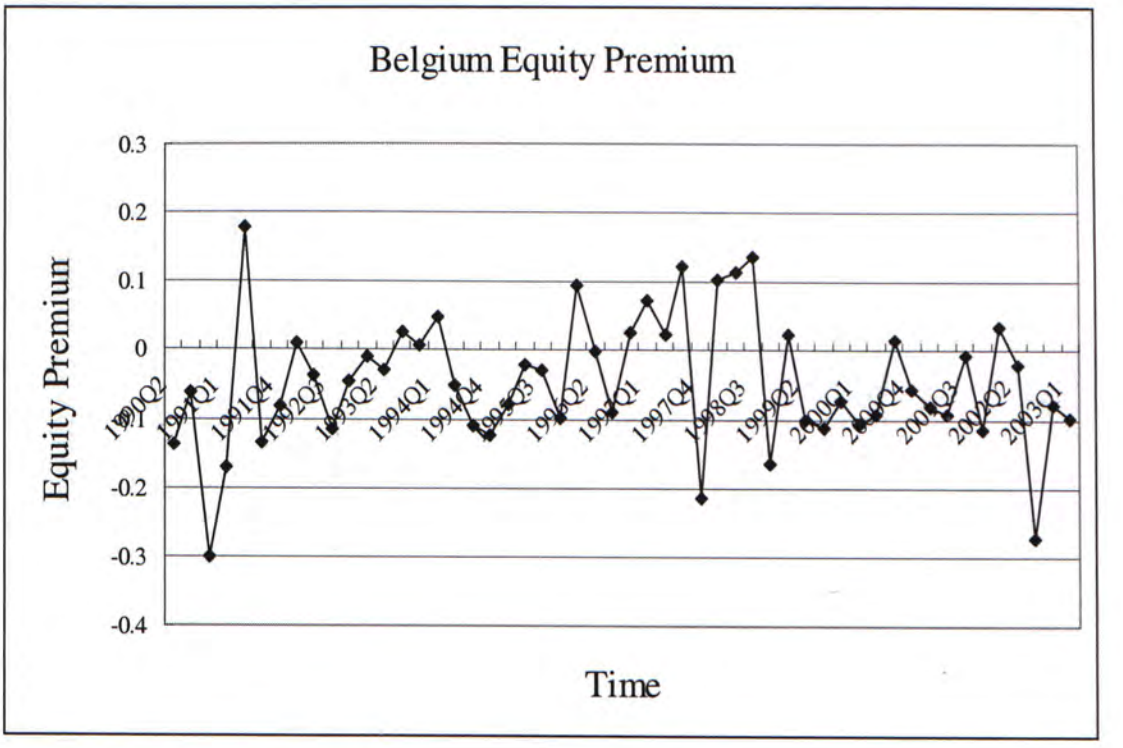

Figure 3.1a: Belgium Equity Premium

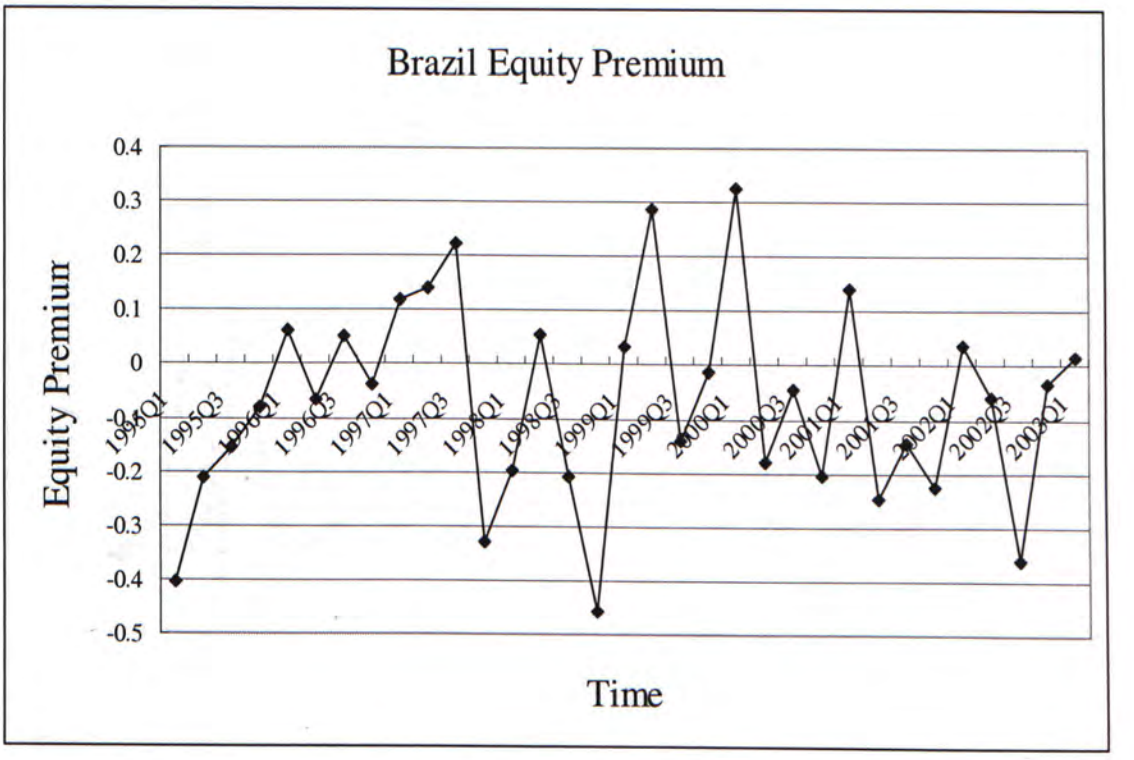

Figure 3.1b: Brazil Equity Premium

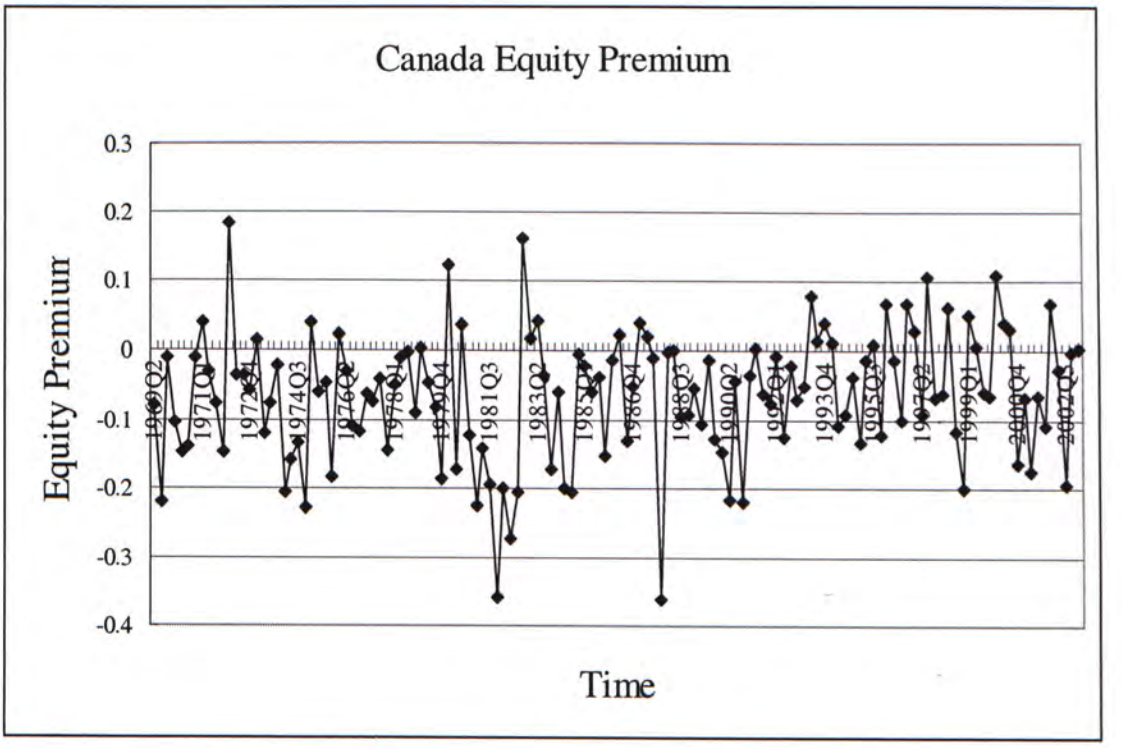

Figure 3.1c: Canada Equity Premium

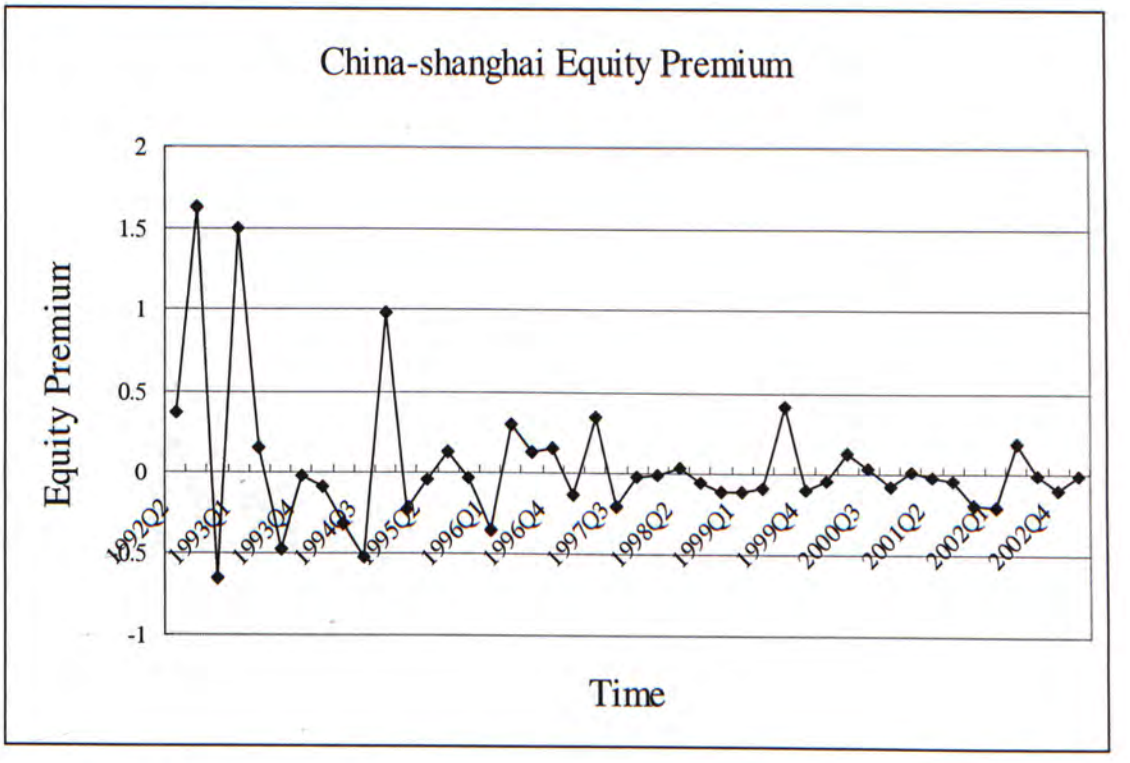

Figure 3.1d: China-shanghai Equity Premium

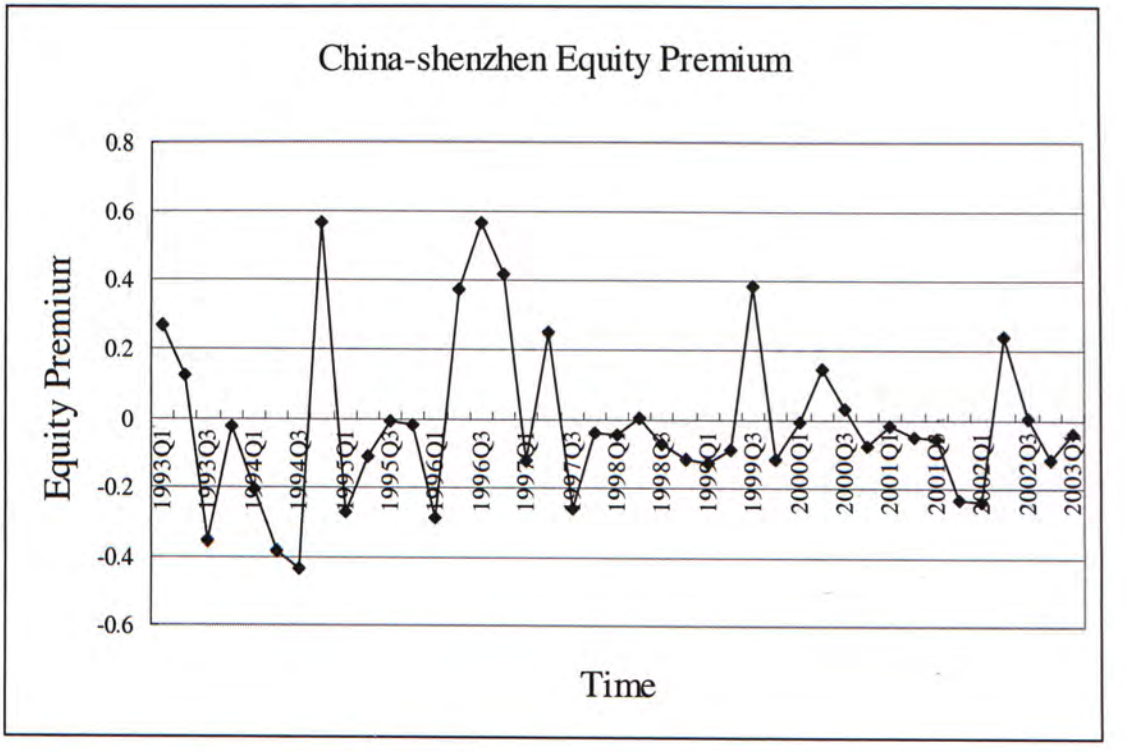

Figure 3.1e: China-shenzhen Equity Premium

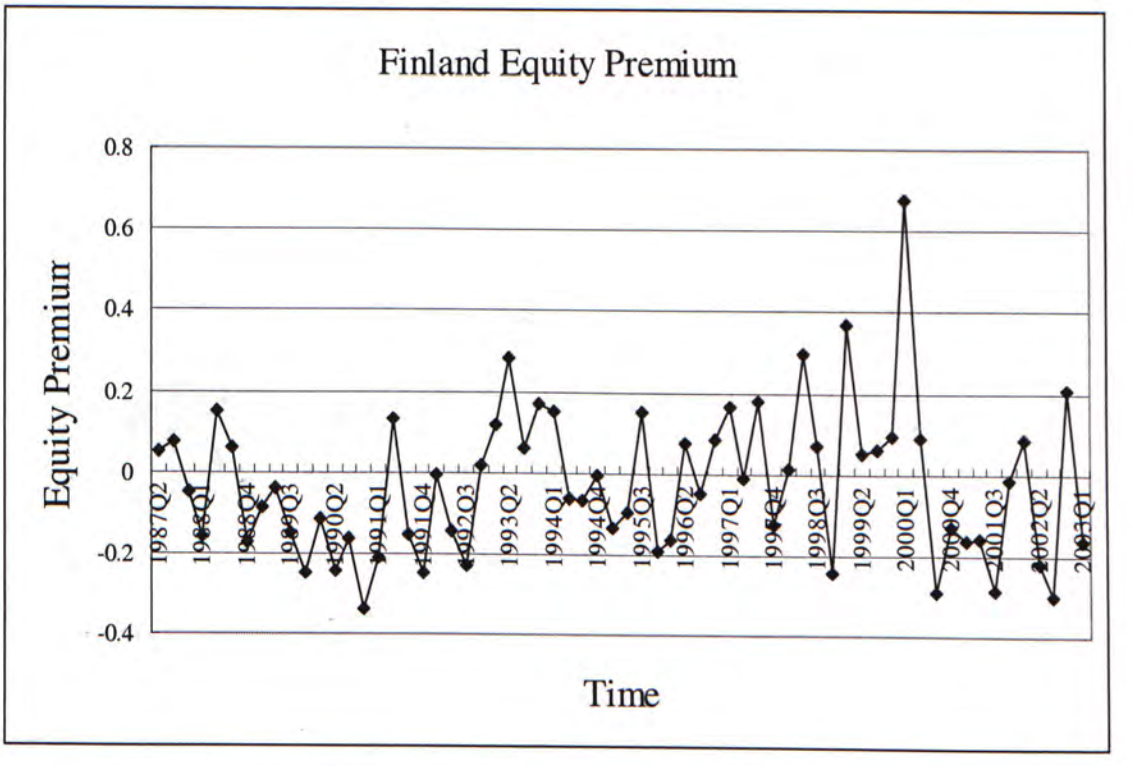

Figure 3.1f: Finland Equity Premium

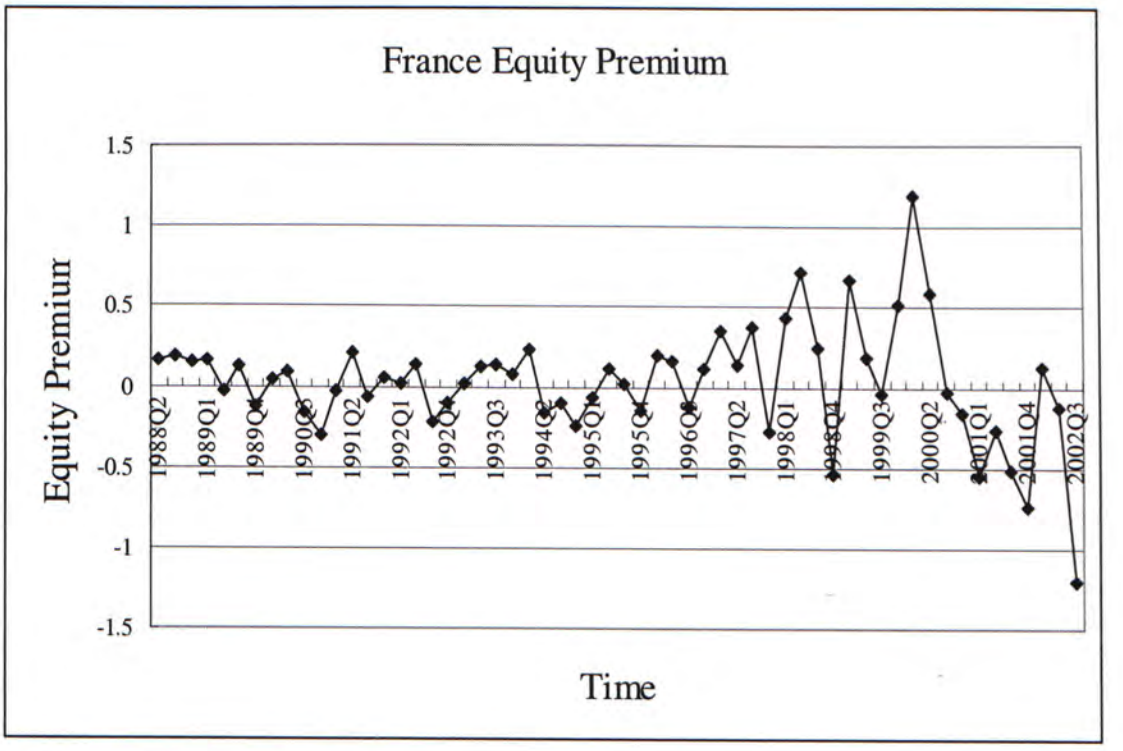

Figure 3.1g: France Equity Premium

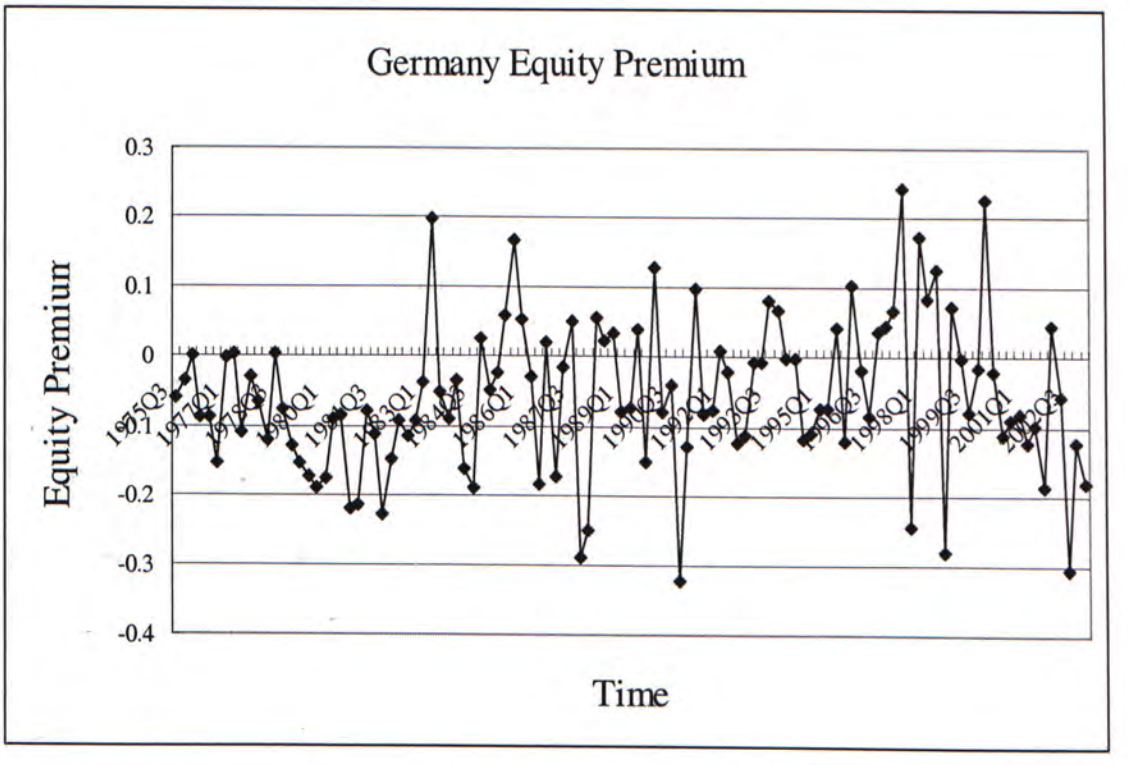

Figure 3.1h: Germany Equity Premium

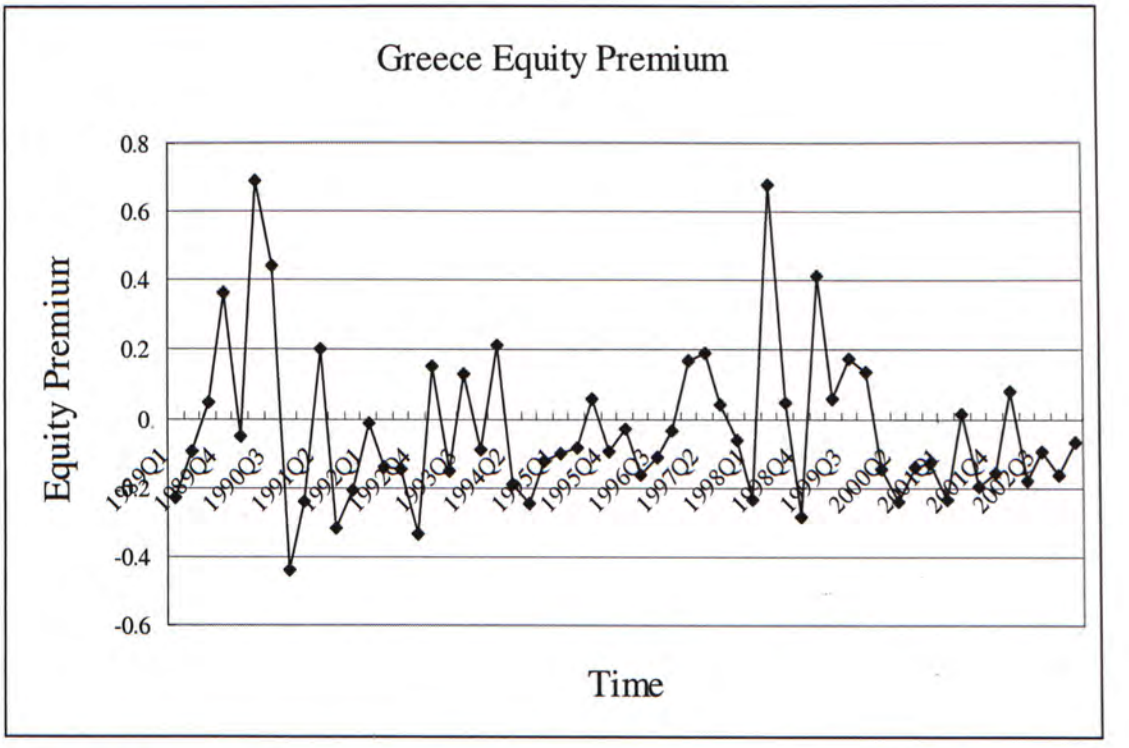

Figure 3.1i: Greece Equity Premium

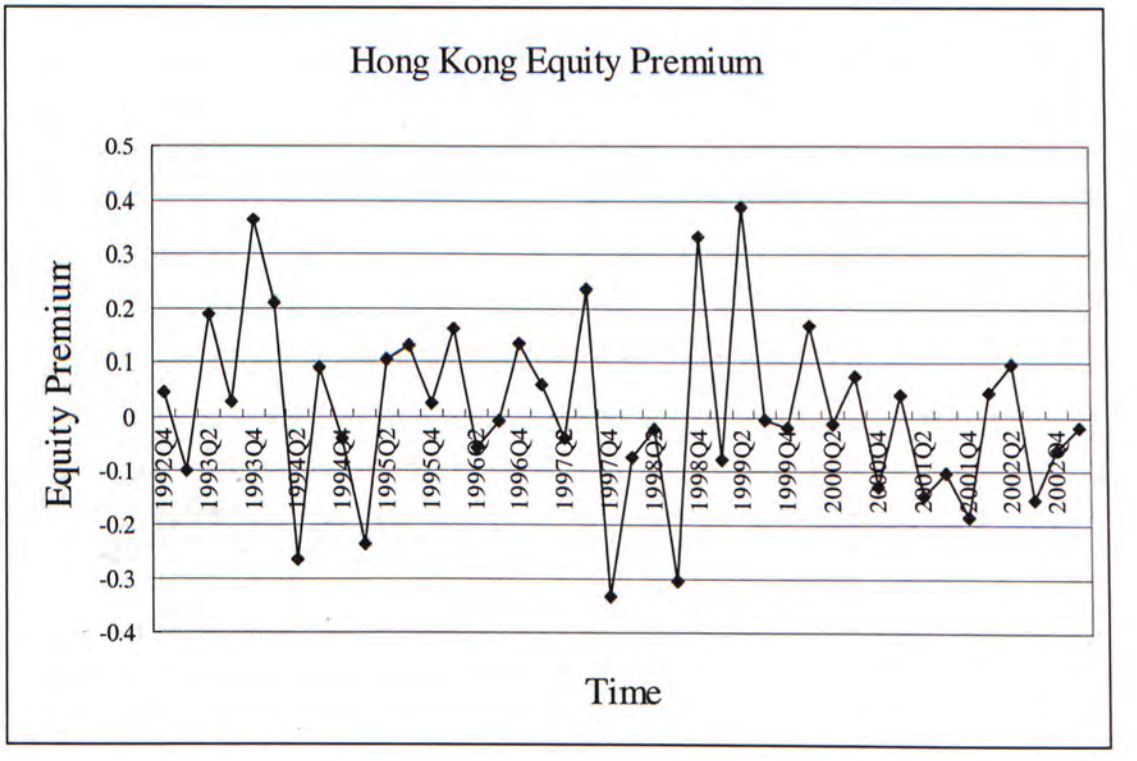

Figure 3.1j: Hong Kong Equity Premium

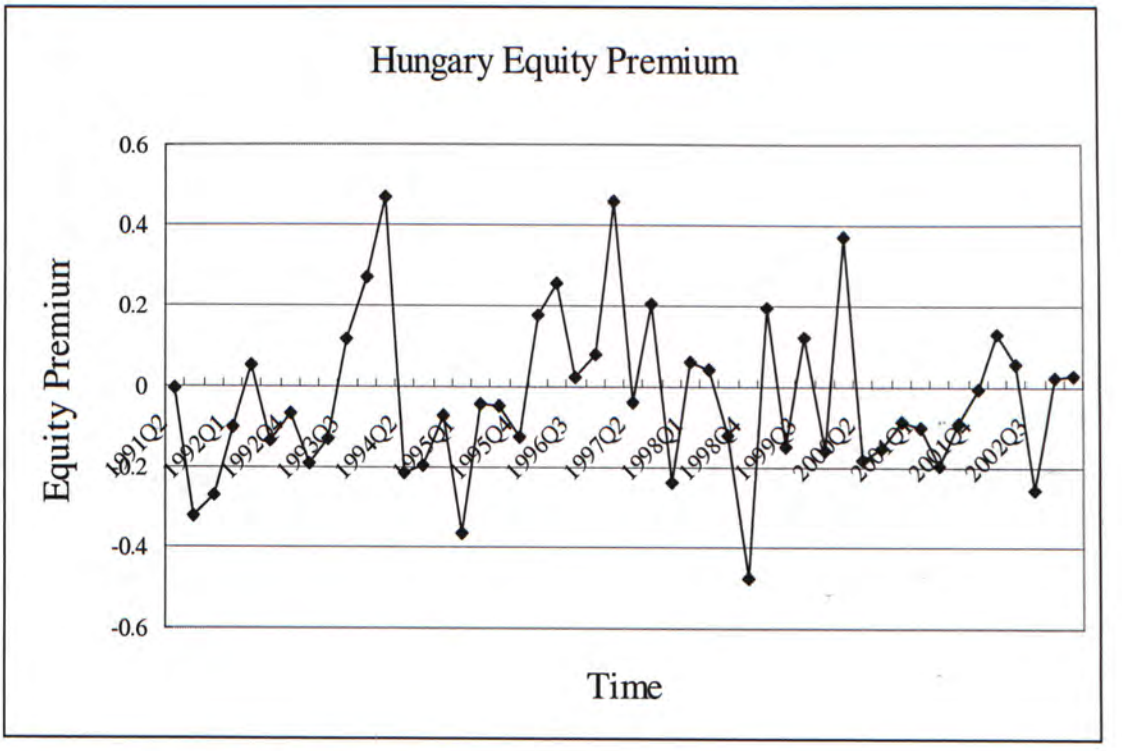

Figure 3.1k: Hungary Equity Premium

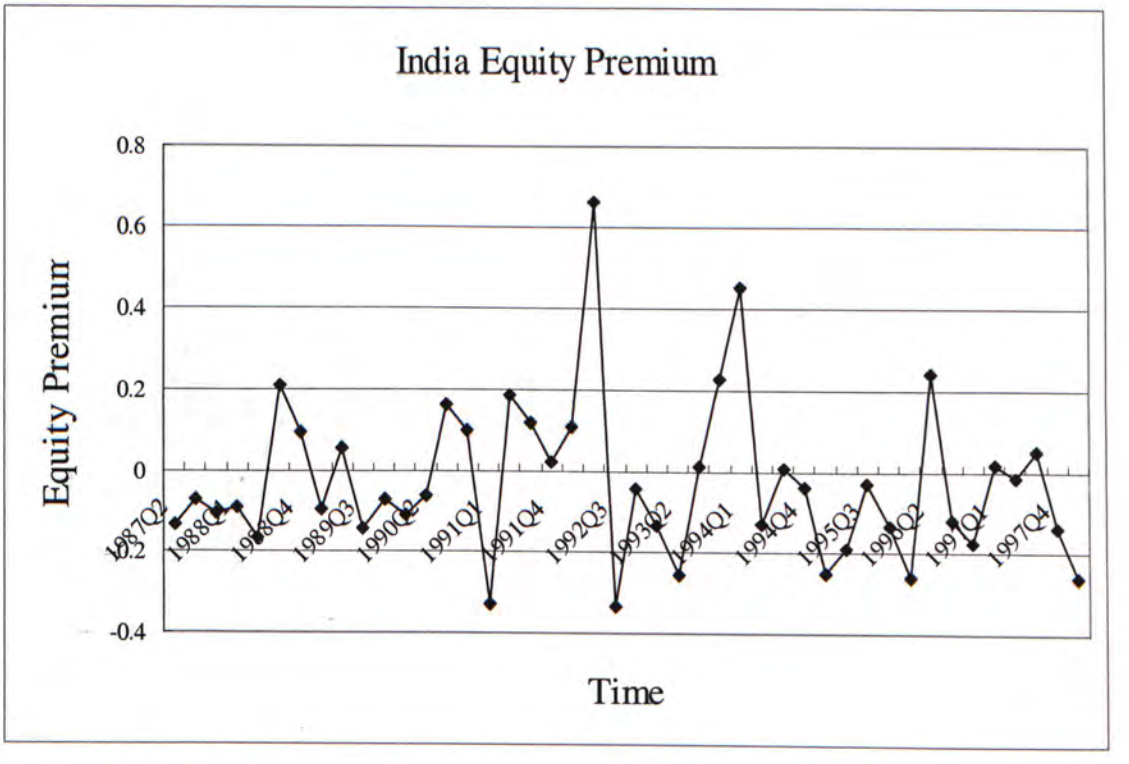

Figure 3.1l: India Equity Premium

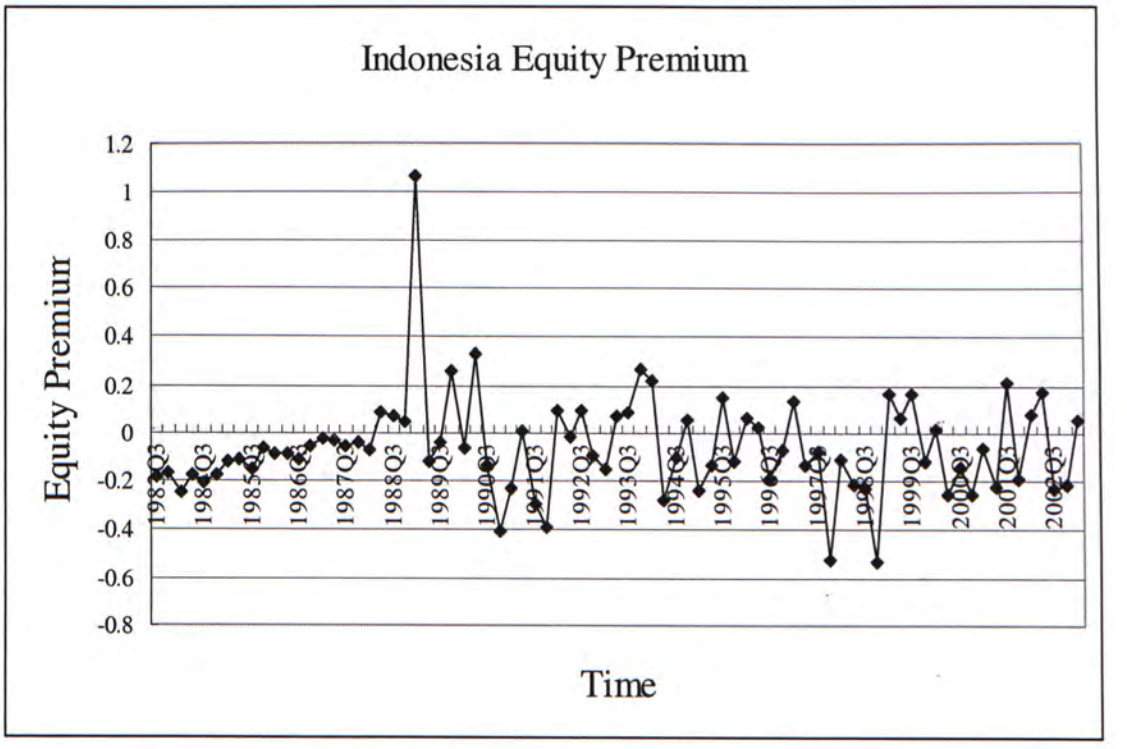

Figure 3.1m: Indonesia Equity Premium

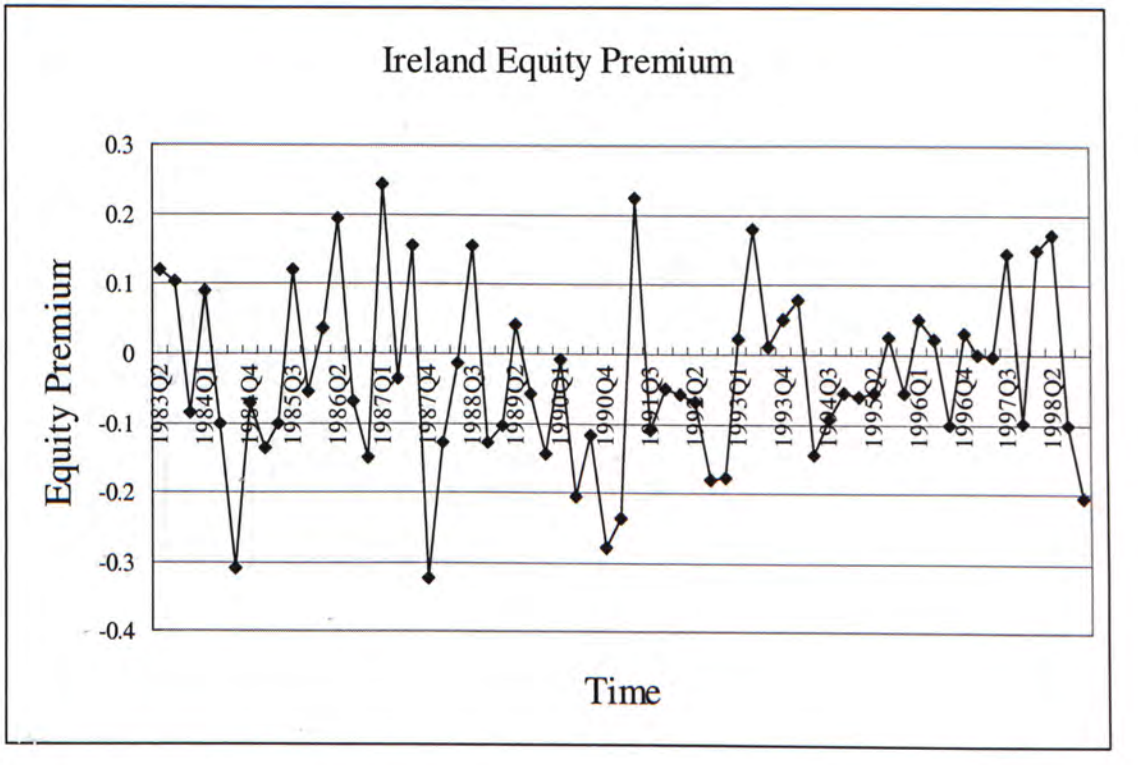

Figure 3.1n: Ireland Equity Premium

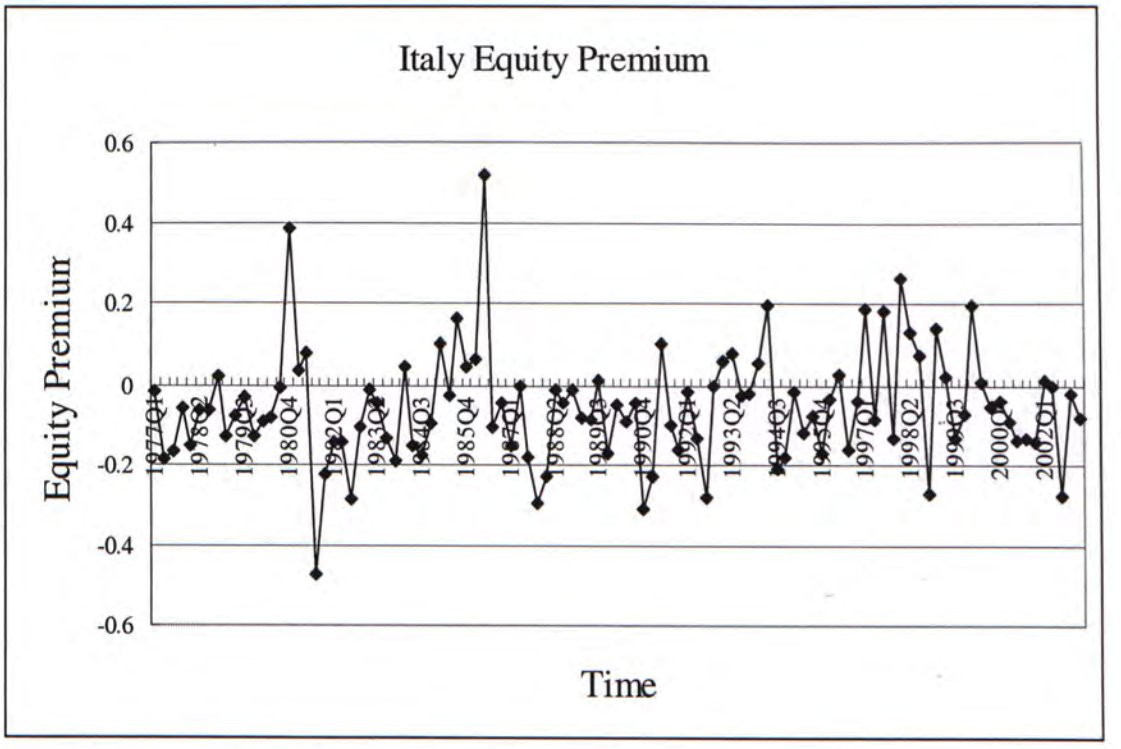

Figure 3.10: Italy Equity Premium

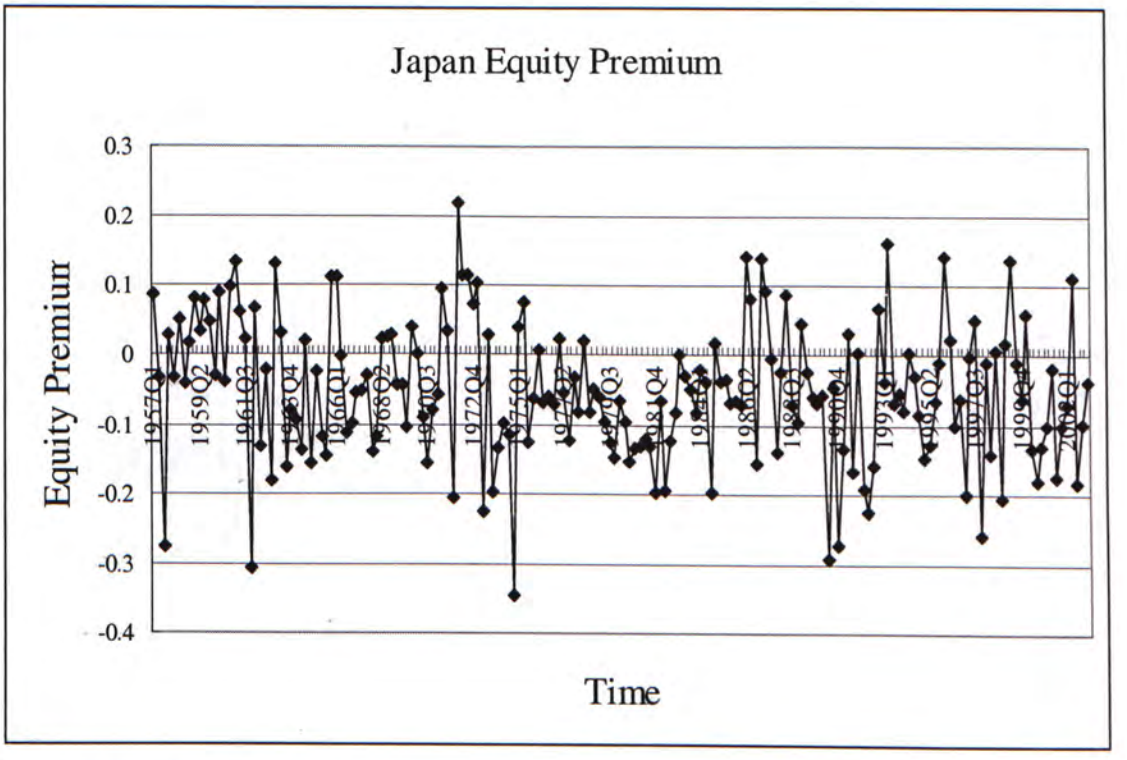

Figure 3.1p: Japan Equity Premium

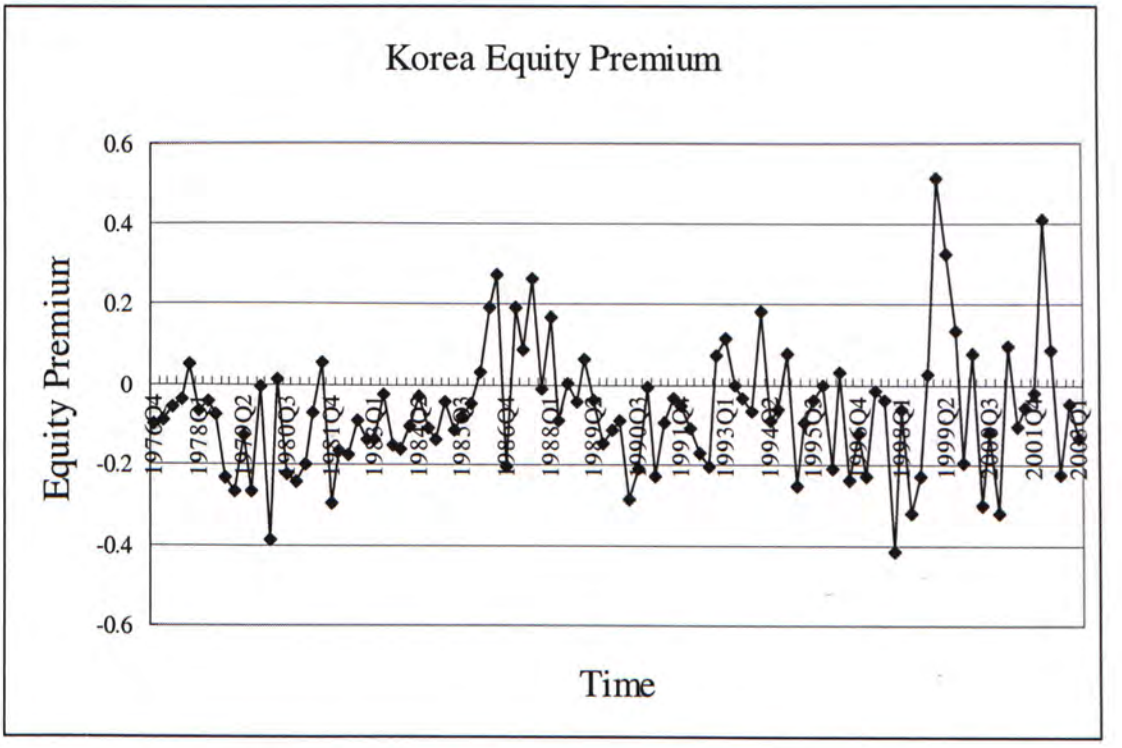

Figure 3.1q: Korea Equity Premium

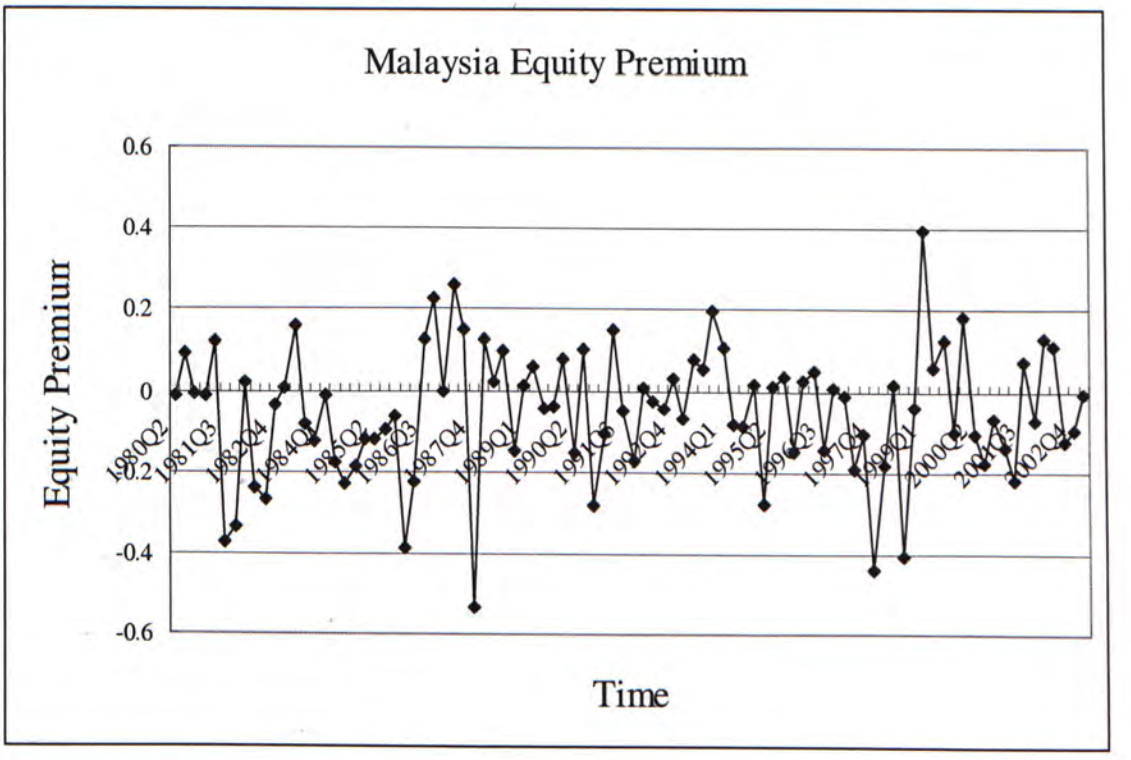

Figure 3.1r: Malaysia Equity Premium

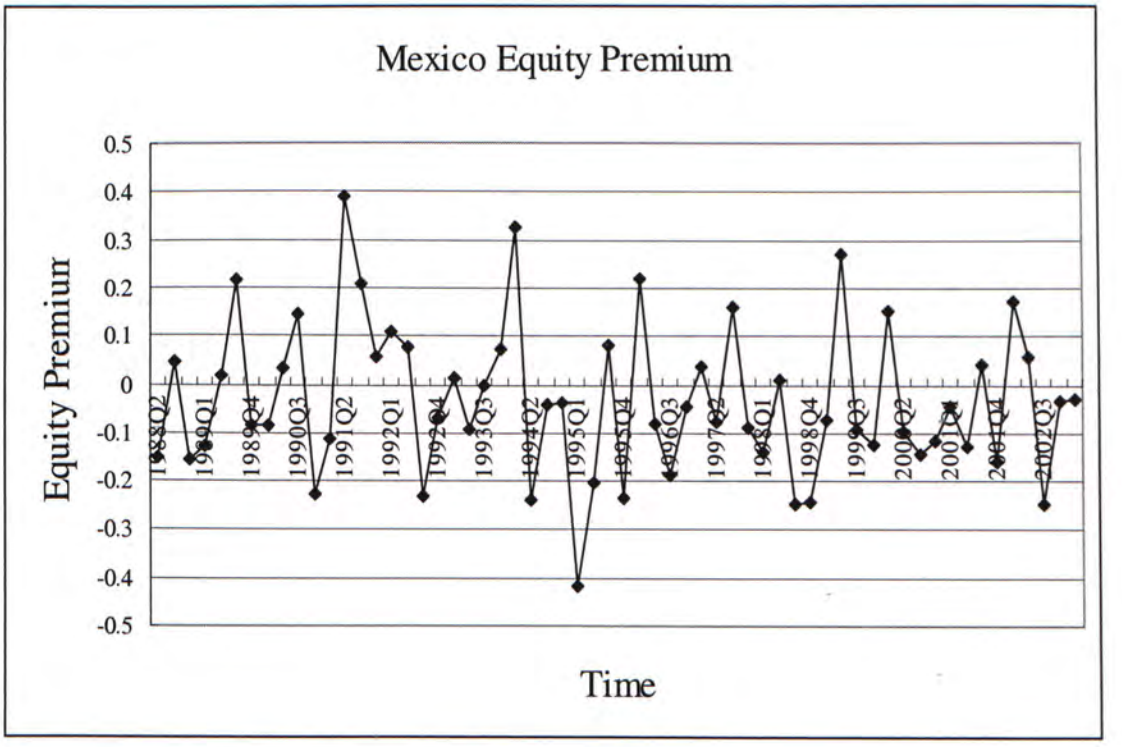

Figure 3.1s: Mexico Equity Premium

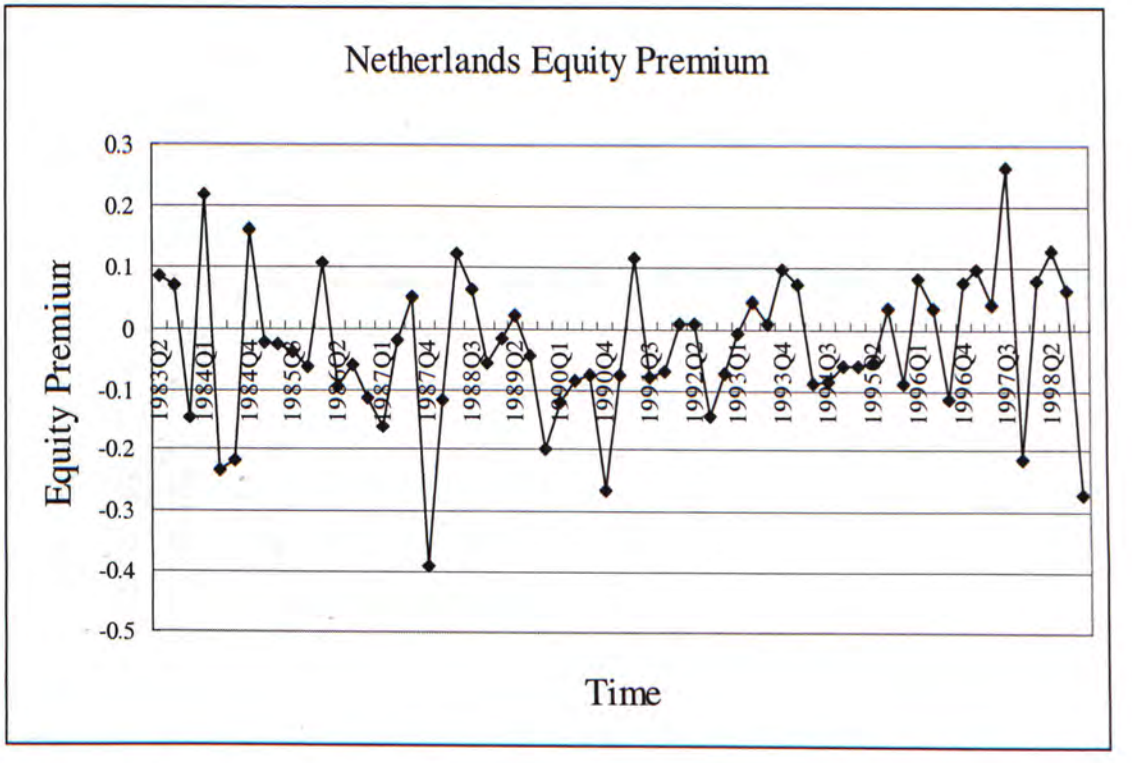

Figure 3.1t: Netherlands Equity Premium

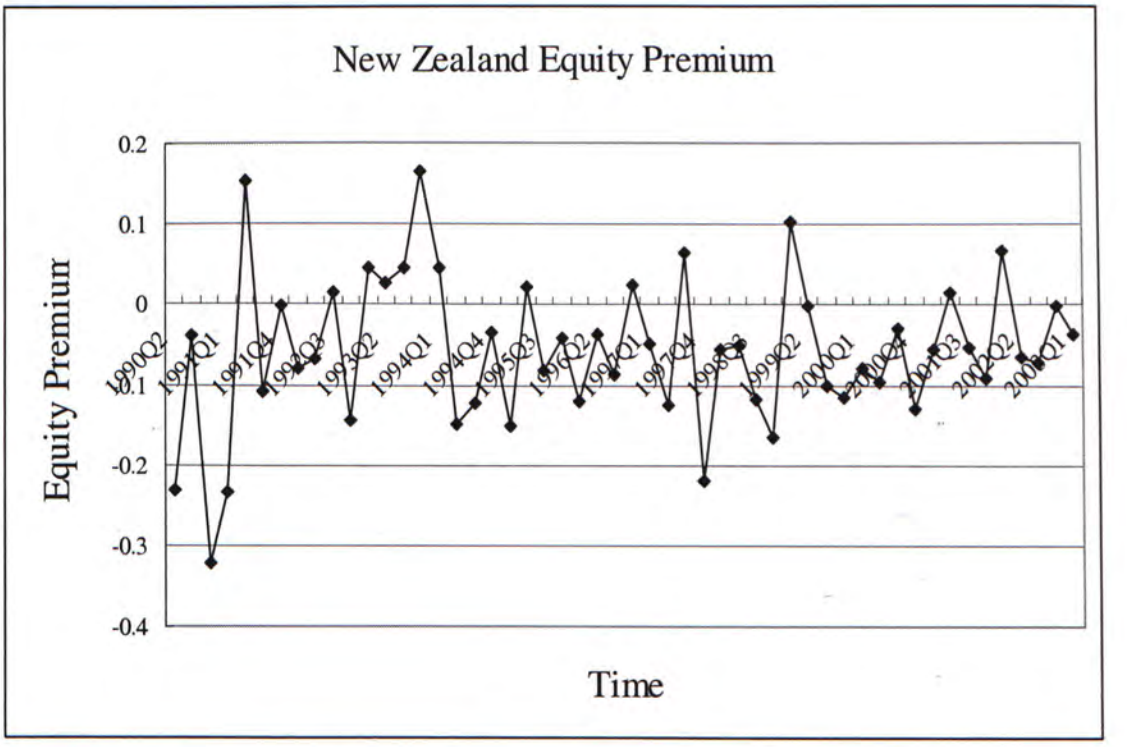

Figure 3.1u: New Zealand Equity Premium

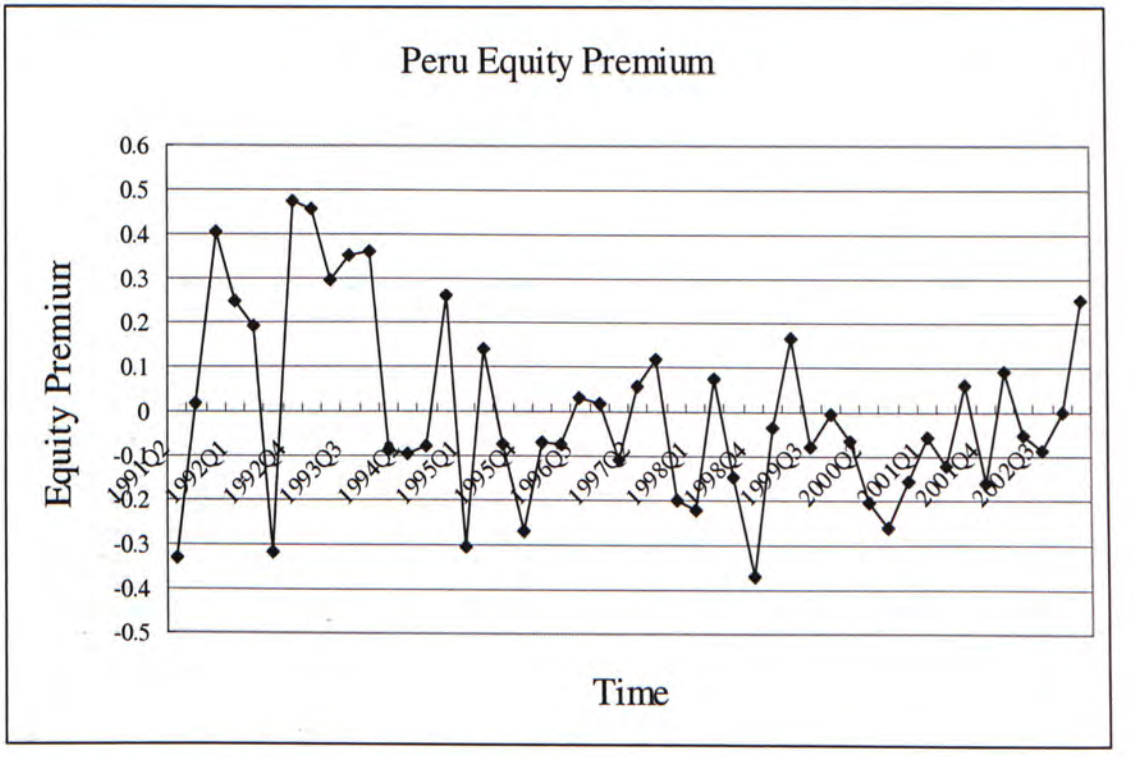

Figure 3.1v: Peru Equity Premium

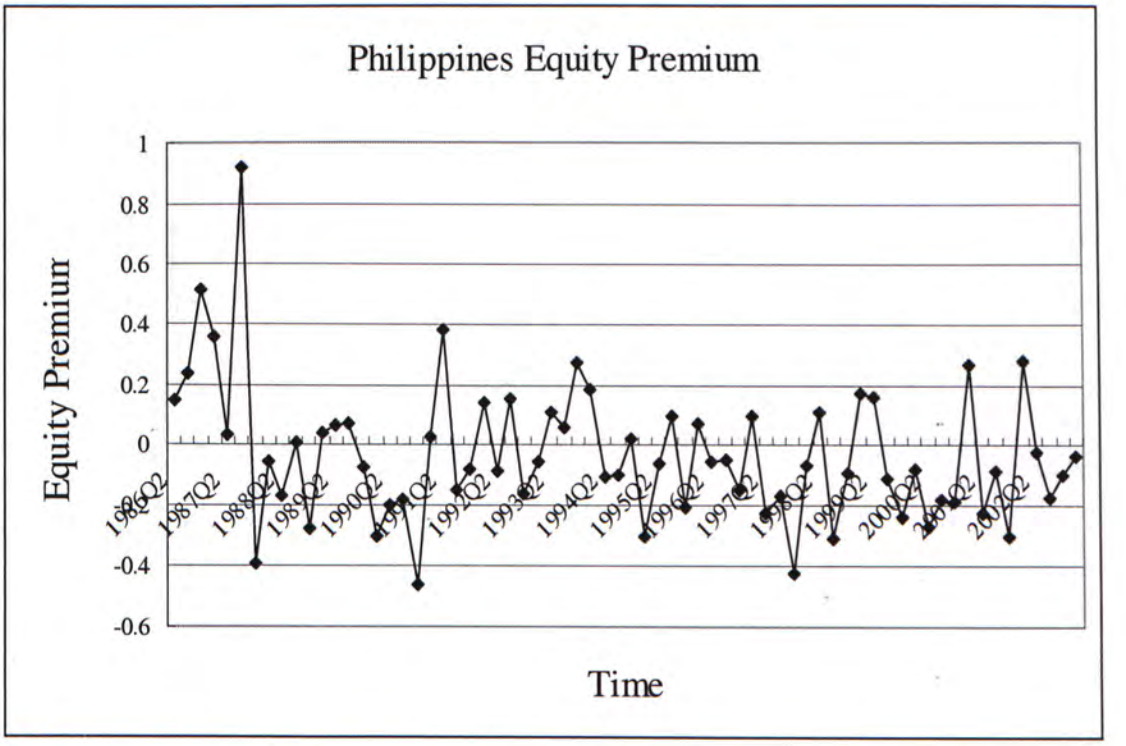

Figure 3.1w: Philippines Equity Premium

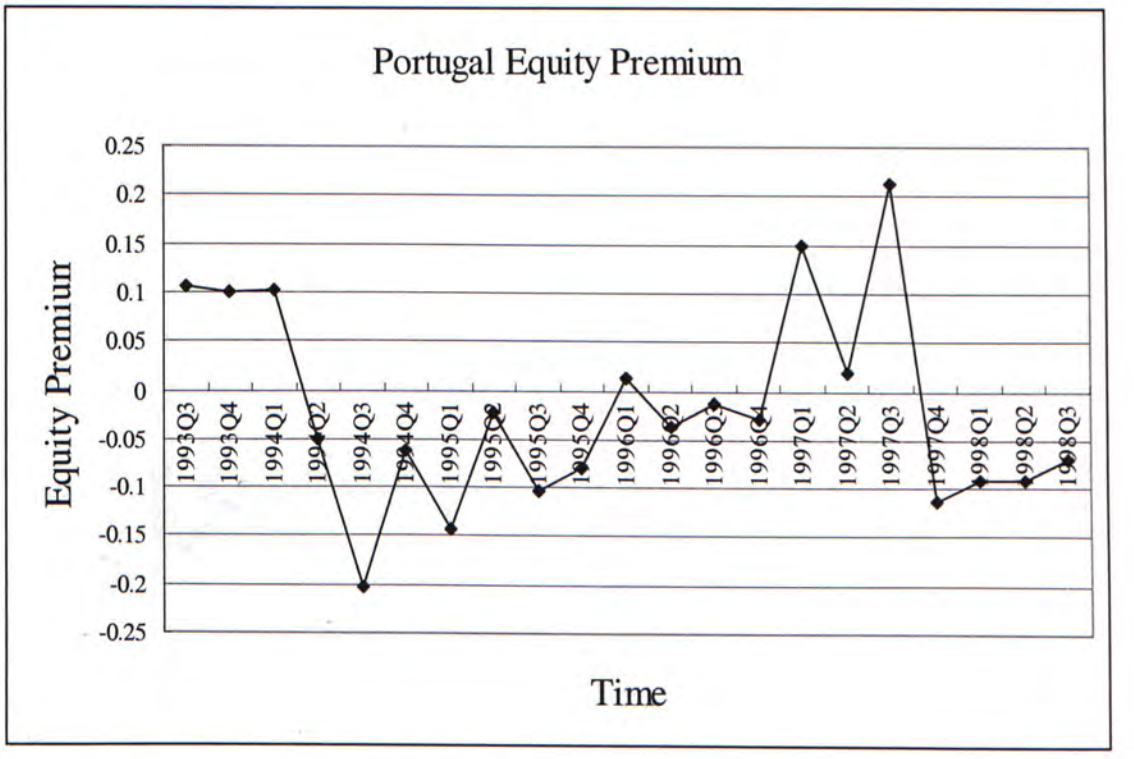

Figure 3.1x: Portugal Equity Premium

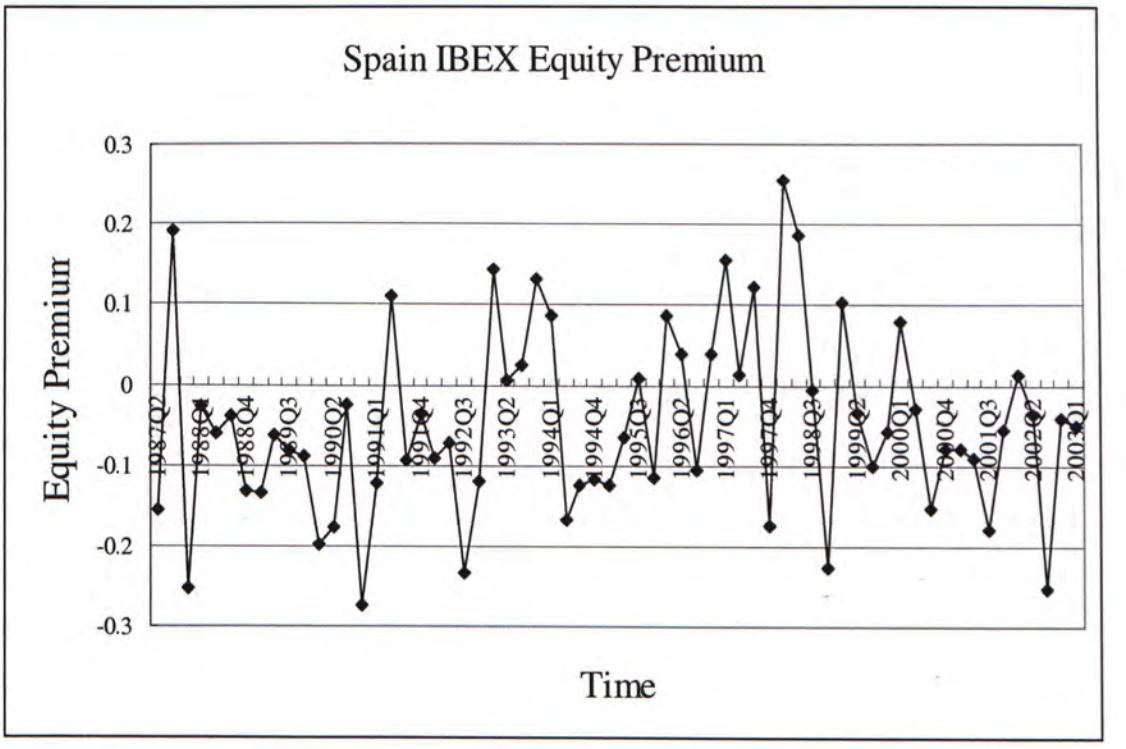

Figure 3.1y: Spain IBEX Equity Premium

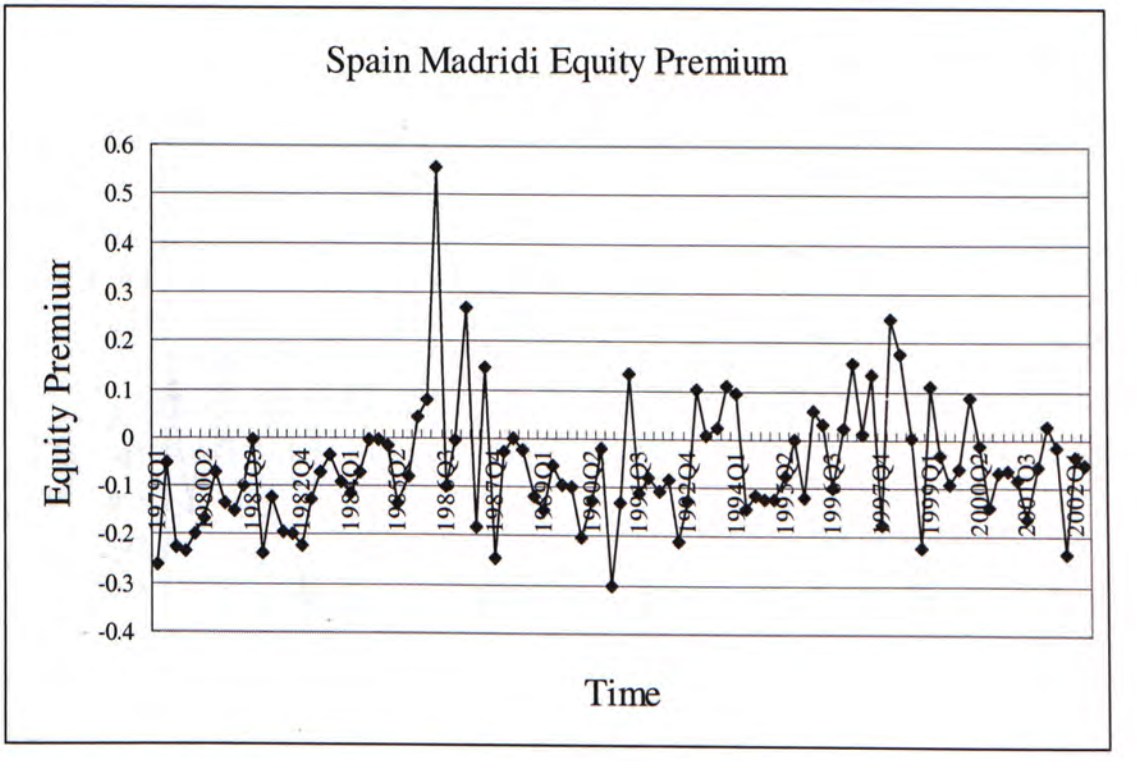

Figure 3.1z: Spain Madridi Equity Premium

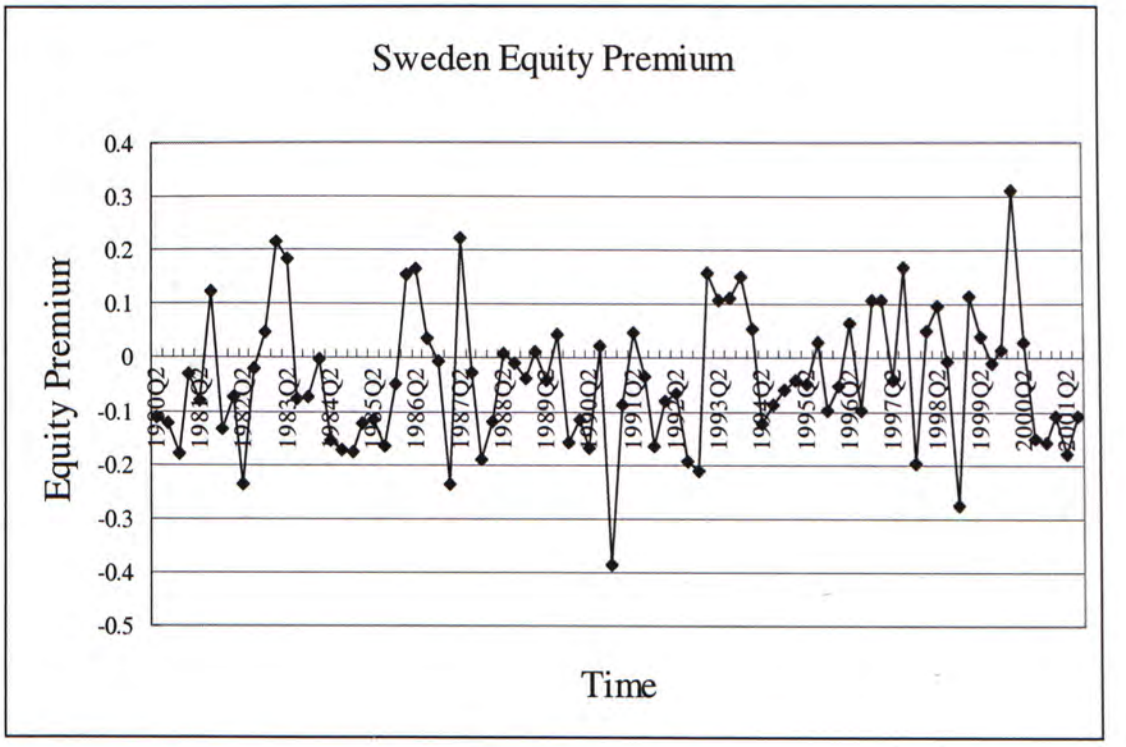

Figure 3.1aa: Sweden Equity Premium

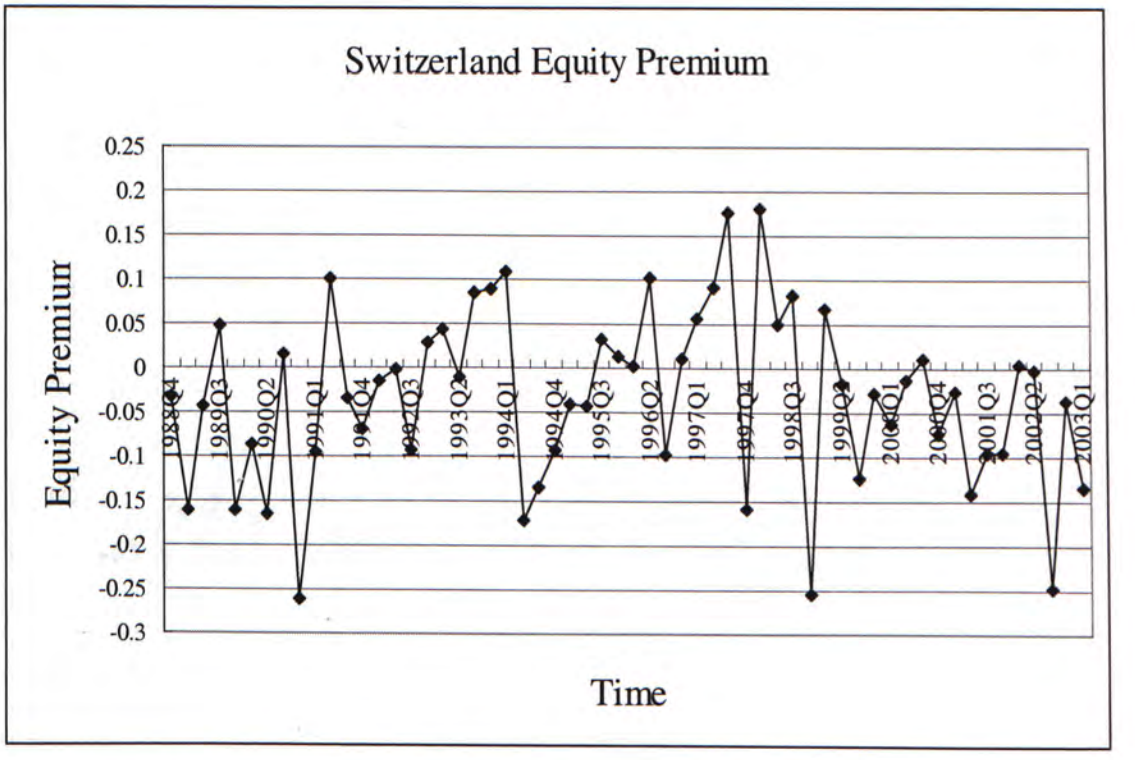

Figure 3.1ab: Switzerland Equity Premium

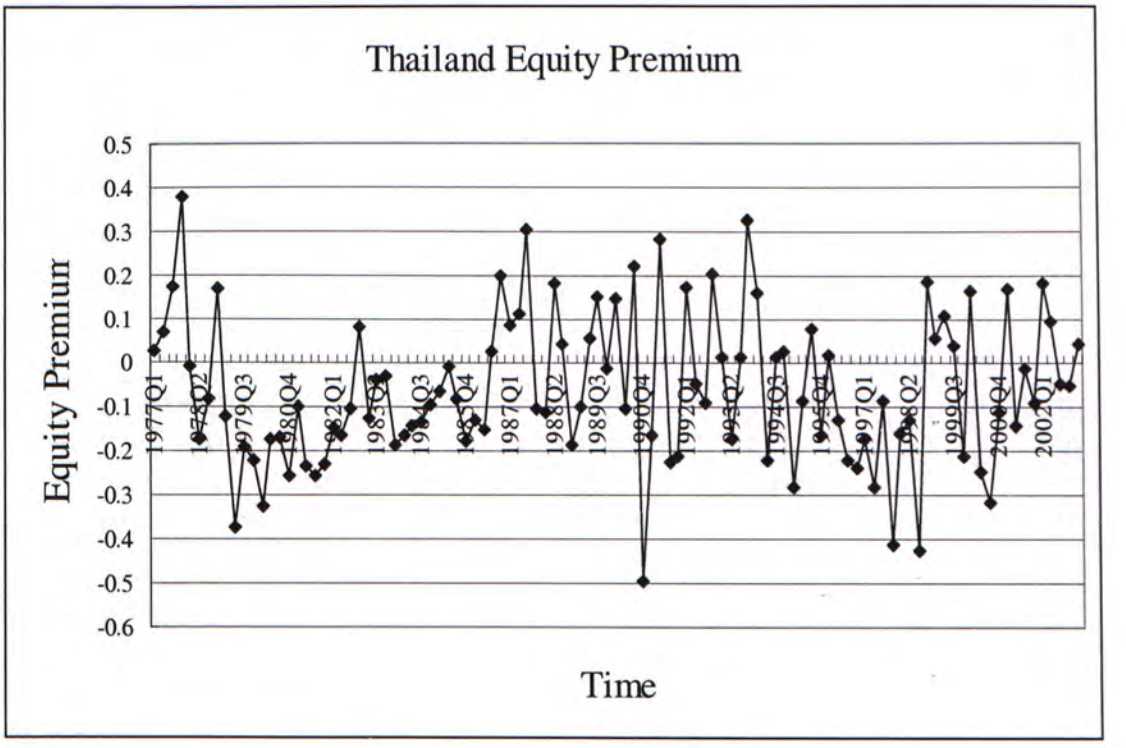

Figure 3.1ac: Thailand Equity Premium

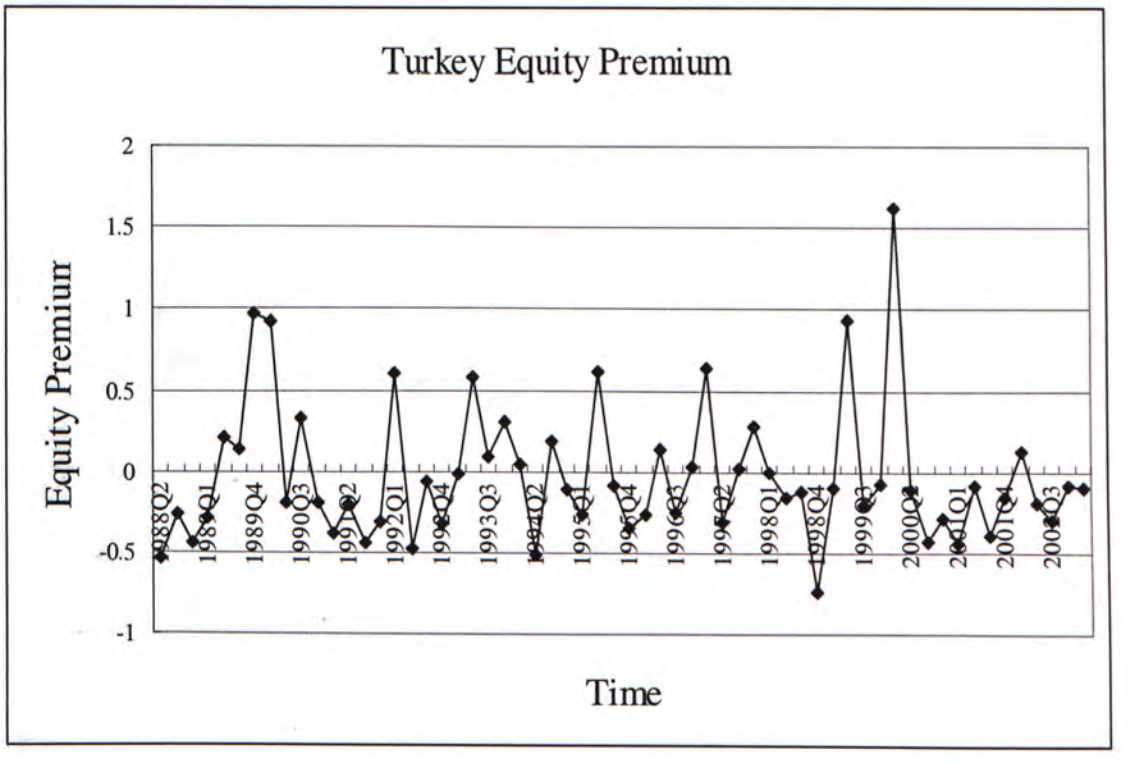

Figure 3.1ad: Turkey Equity Premium

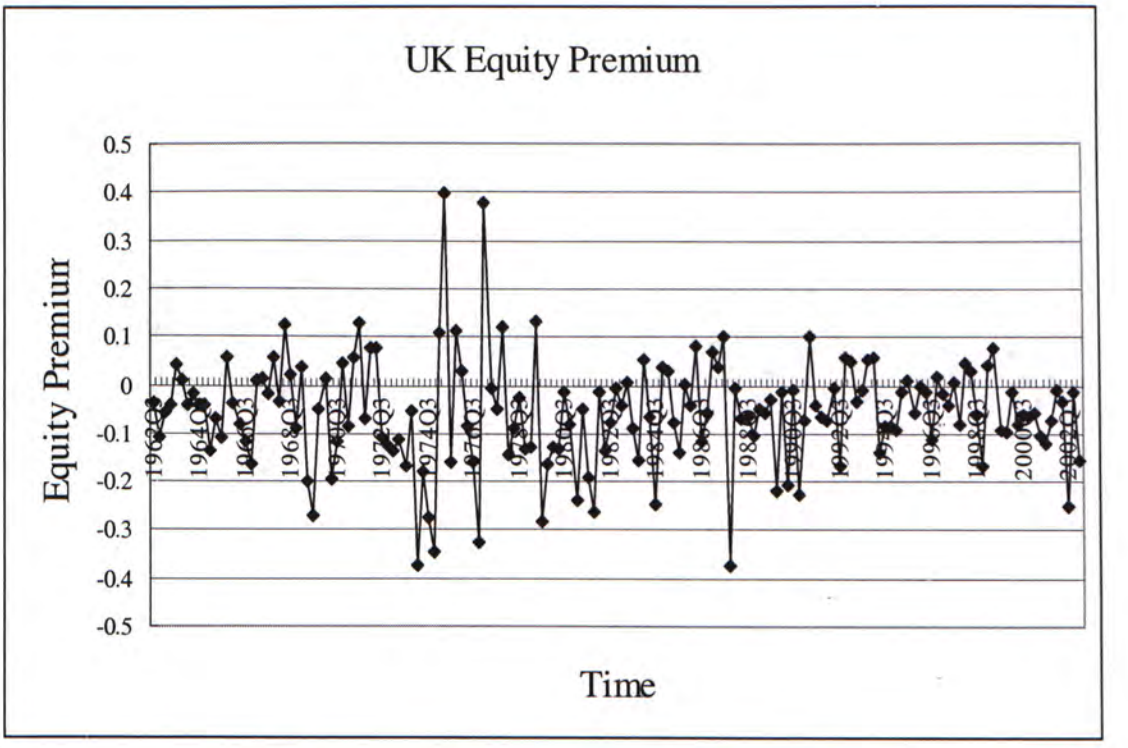

Figure 3.1ae: UK Equity Premium

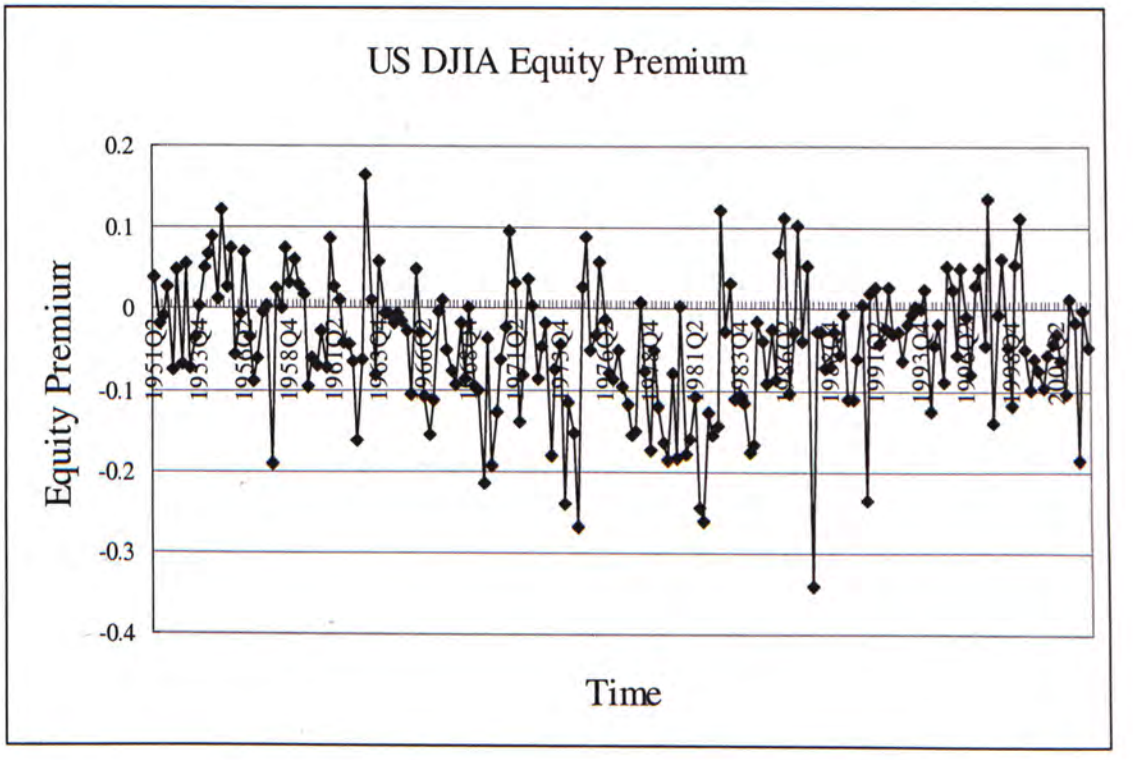

Figure 3.1af: US DJIA Equity Premium

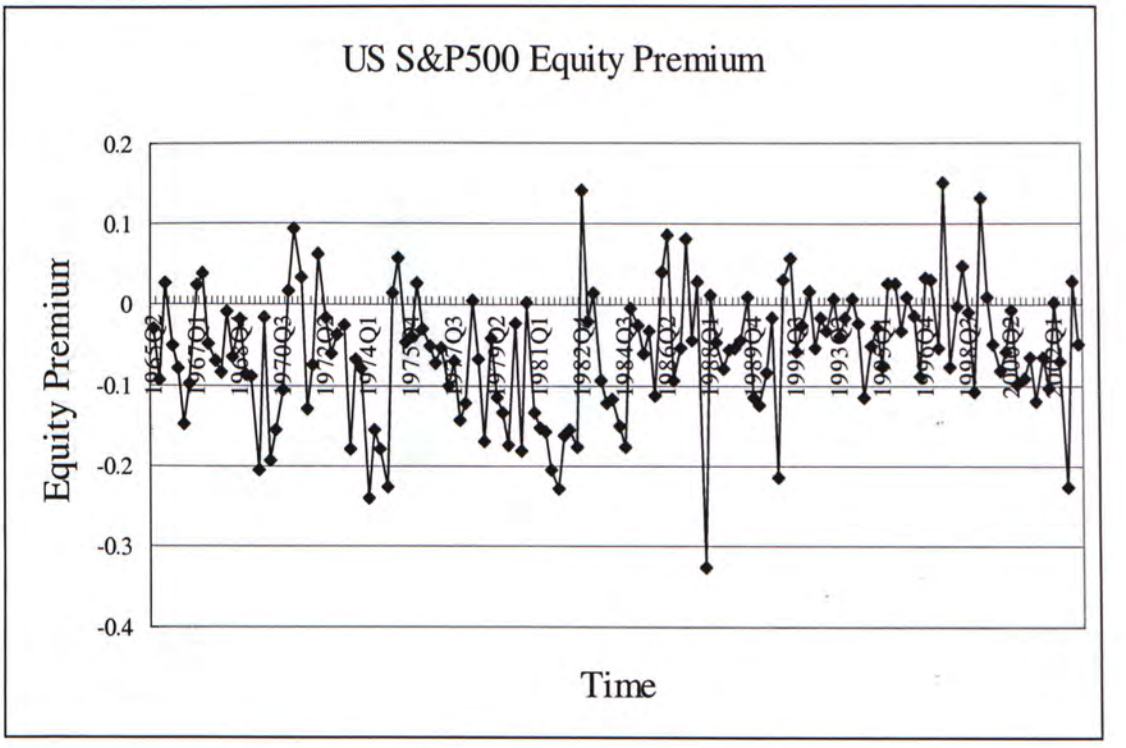

Figure 3.1ag: US S&P500 Equity Premium

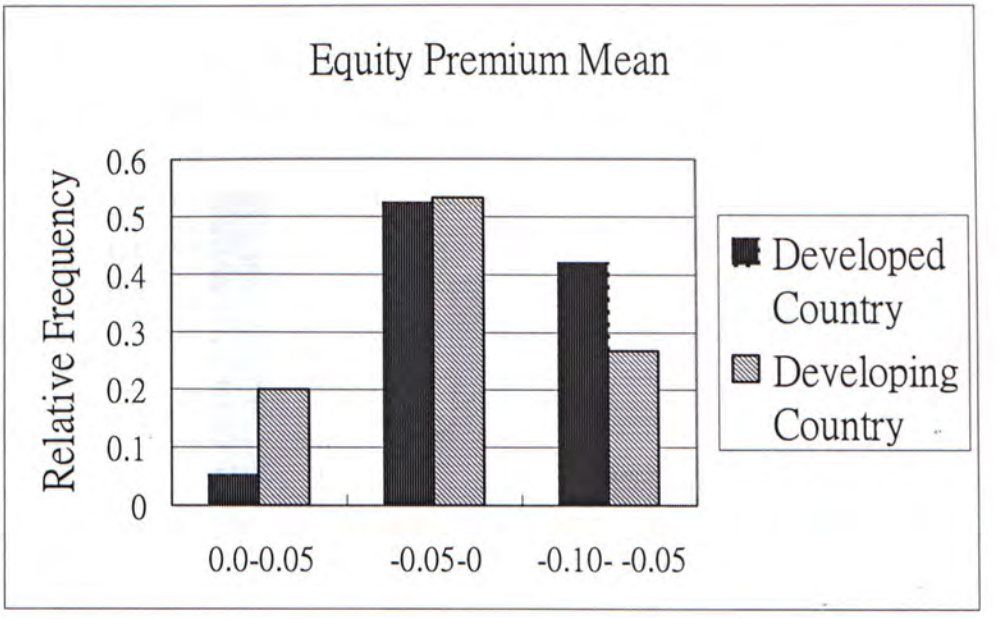

Figure 3.2: Distribution of the Equity Premium Mean according to the development level of the country

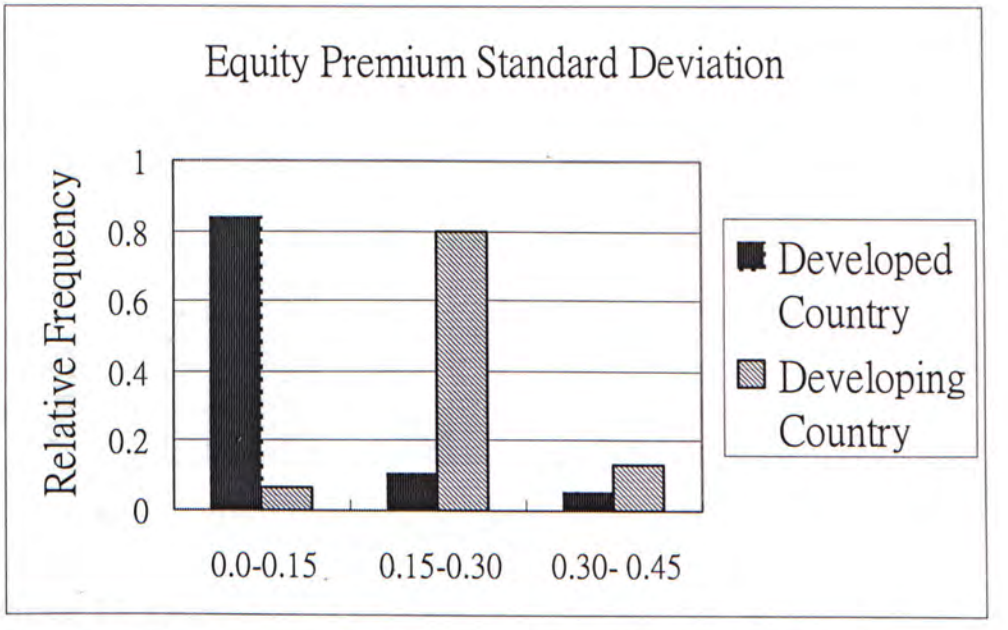

Figure 3.3: Distribution of the Equity Premium standard deviation according to the development level of the country

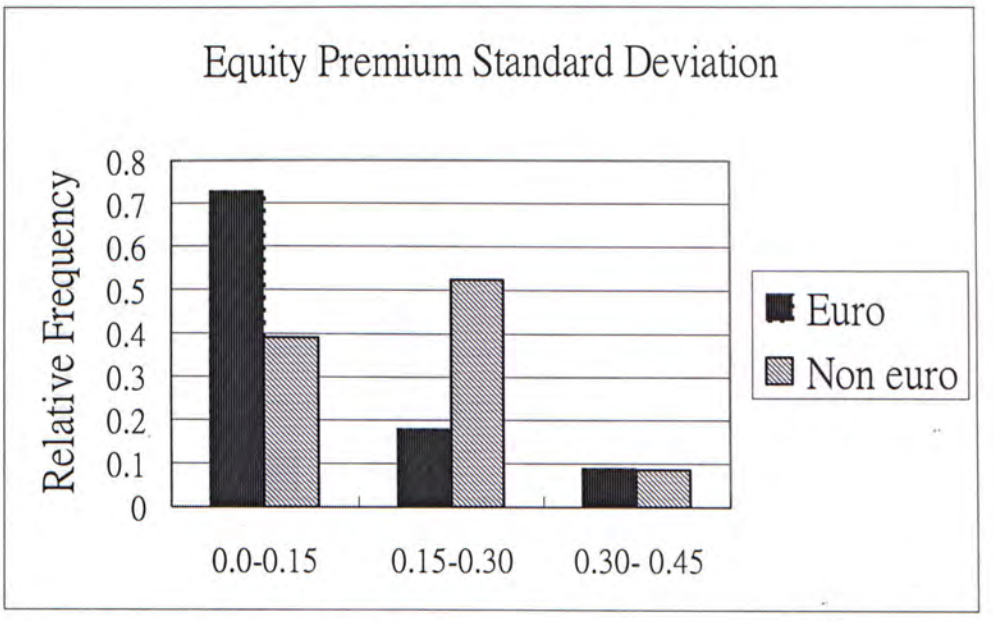

Figure 3.4: Distribution of the Equity Premium Mean according to the euro/non-euro zone

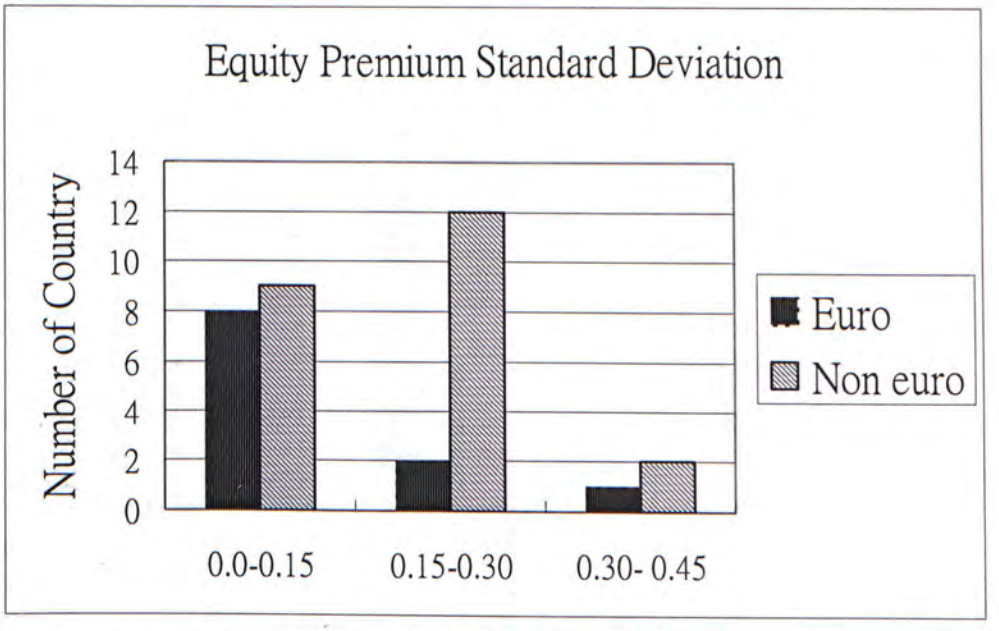

Figure 3.5: Distribution of the Equity Premium standard deviation according to the euro/non-euro zone

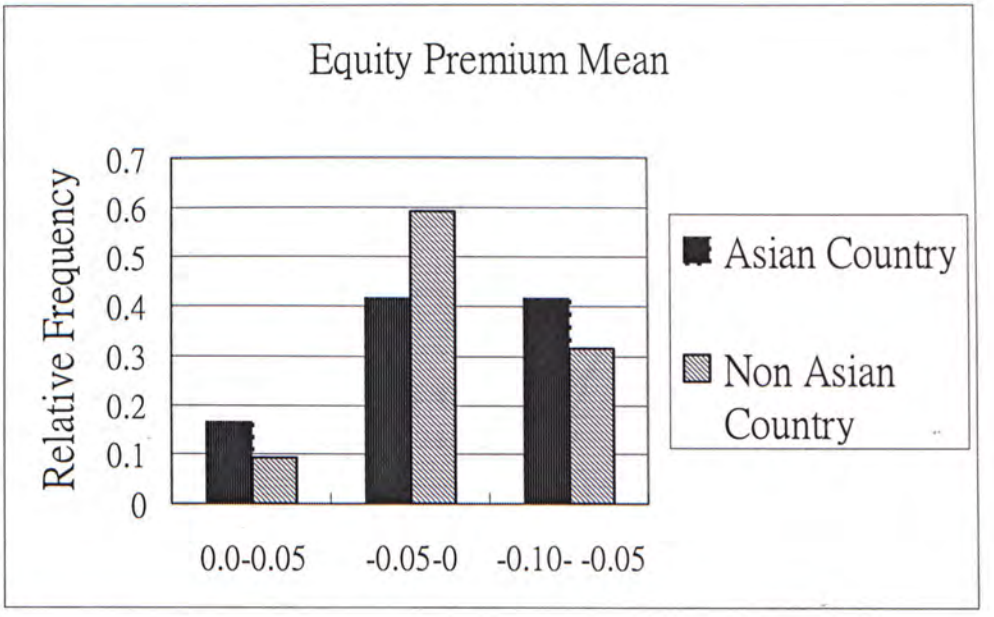

Figure 3.6: Distribution of the Equity Premium mean according to the Asian/non-Asian country

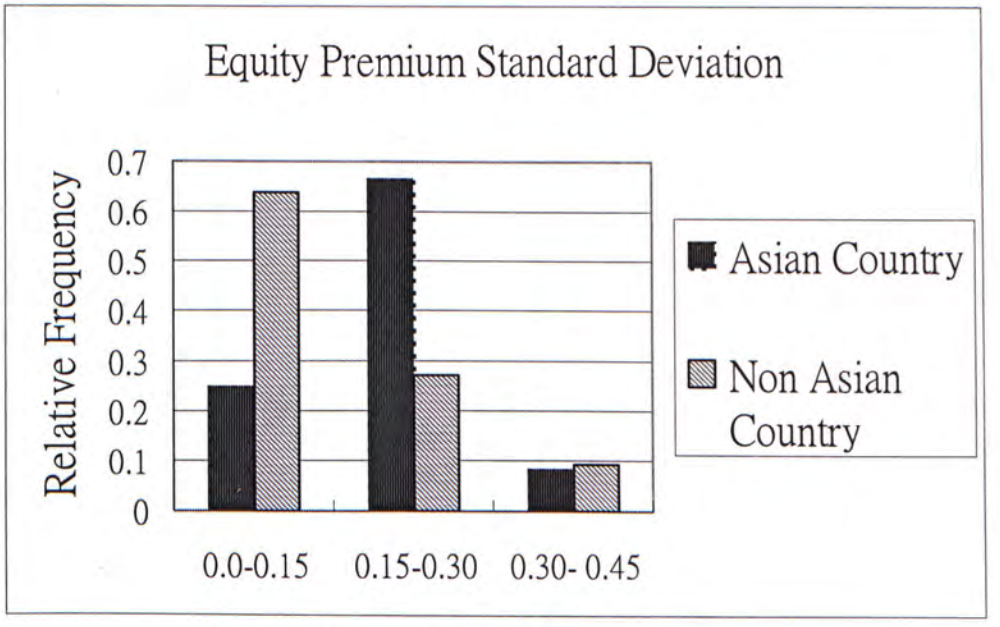

Figure 3.7: Distribution of the Equity Premium standard deviation according to the Asian/non-Asian country

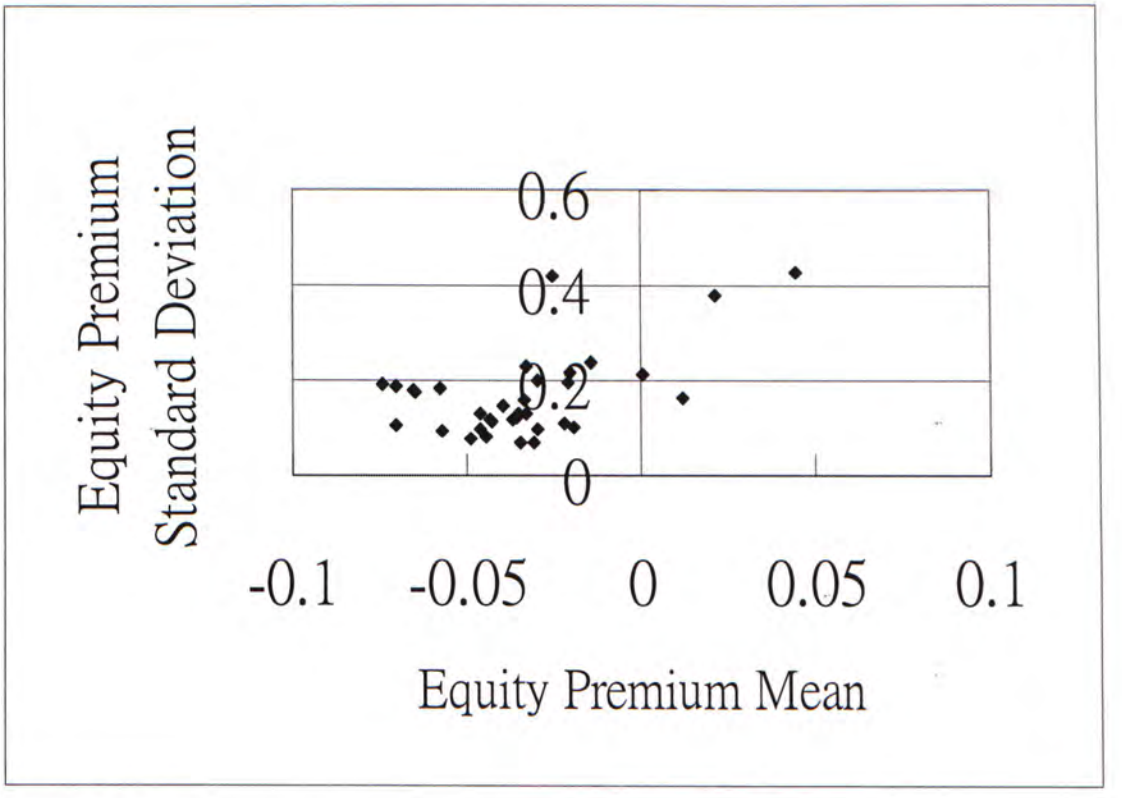

Figure 3.8: The relationship between Equity Premium Mean and Standard Deviation in the 90s

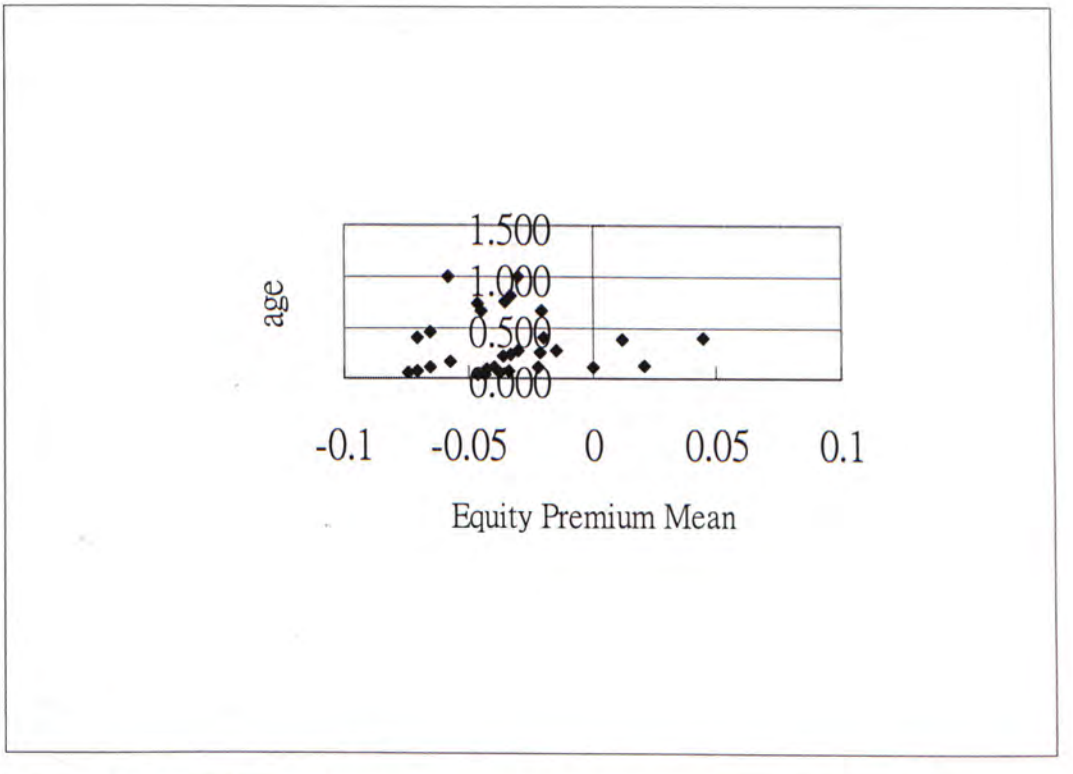

Figure 3.9: The relationship between Equity Premium Mean and Age of democracy in the 90s

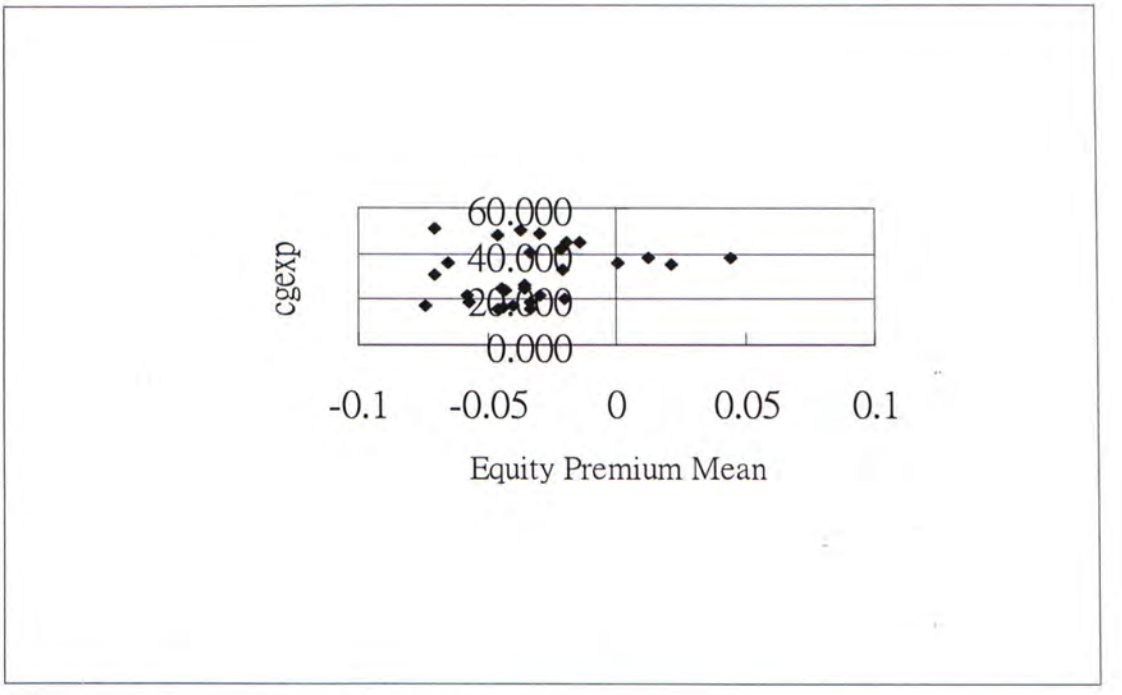

Figure 3.10: The relationship between Equity Premium Mean and Central government expenditure as a percentage of GDP in the 90s

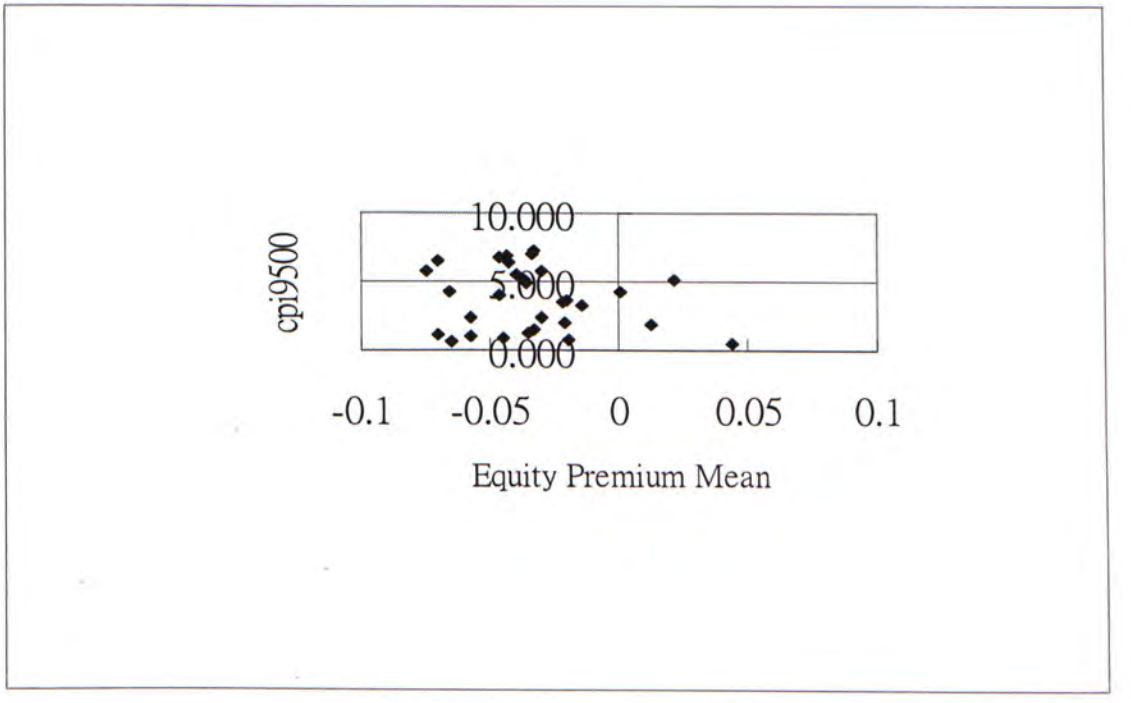

Figure 3.11: The relationship between Equity Premium Mean and Corruption Perception Index in the 90s

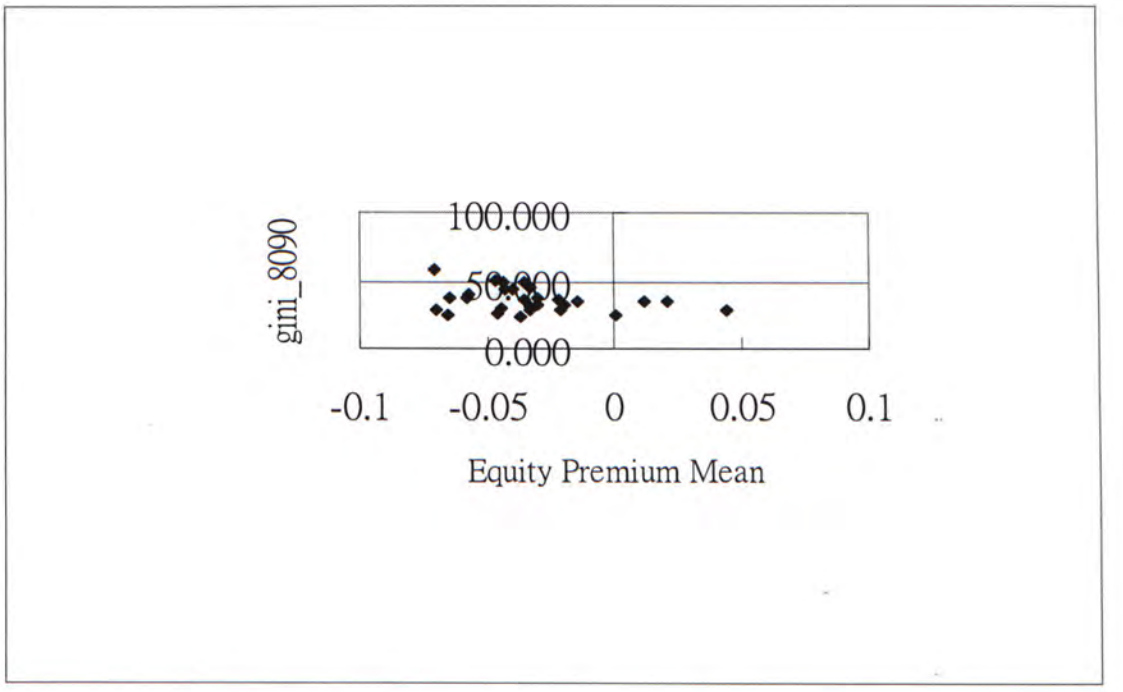

Figure 3.12: The relationship between Equity Premium Mean and Gini index on income distribution in the 90s

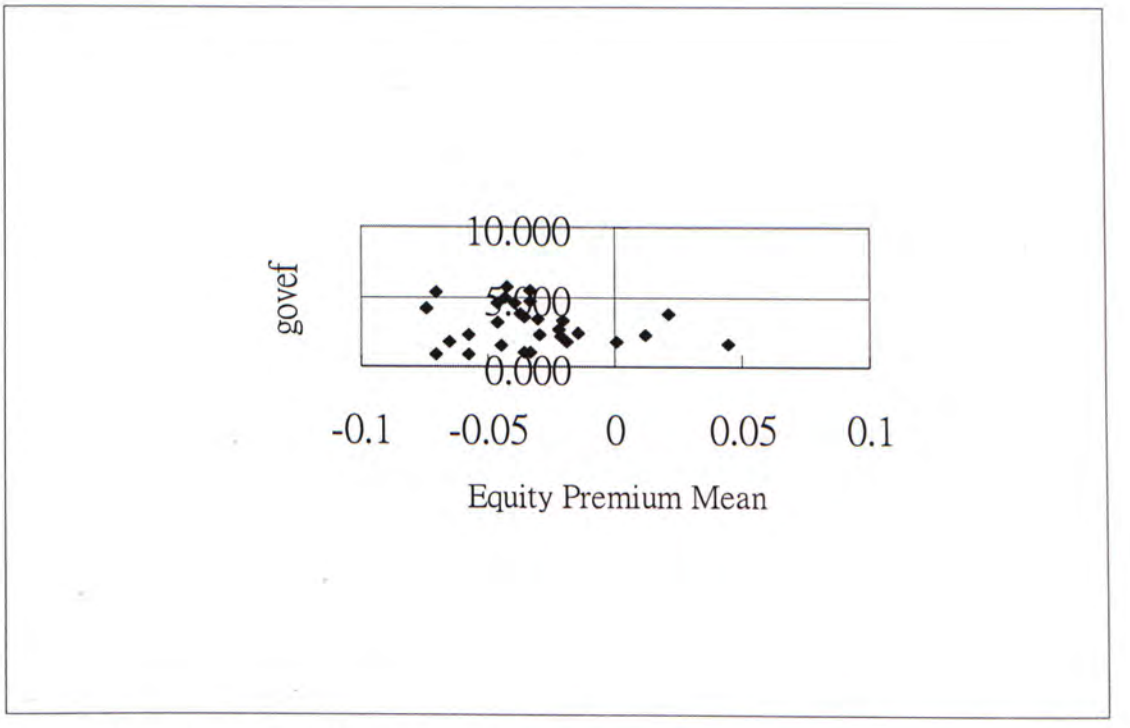

Figure 3.13: The relationship between Equity Premium Mean and Government Effectiveness in the 90s

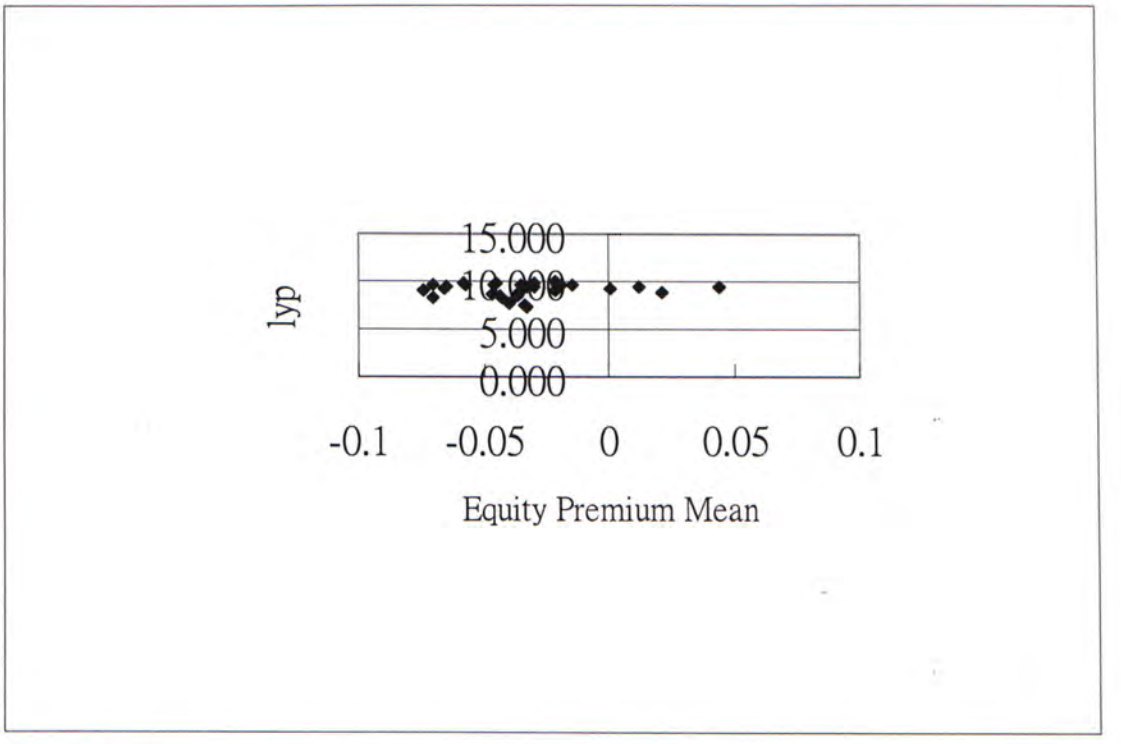

Figure 3.14: The relationship between Equity Premium Mean and Natural log of per capita real GDP in the 90s

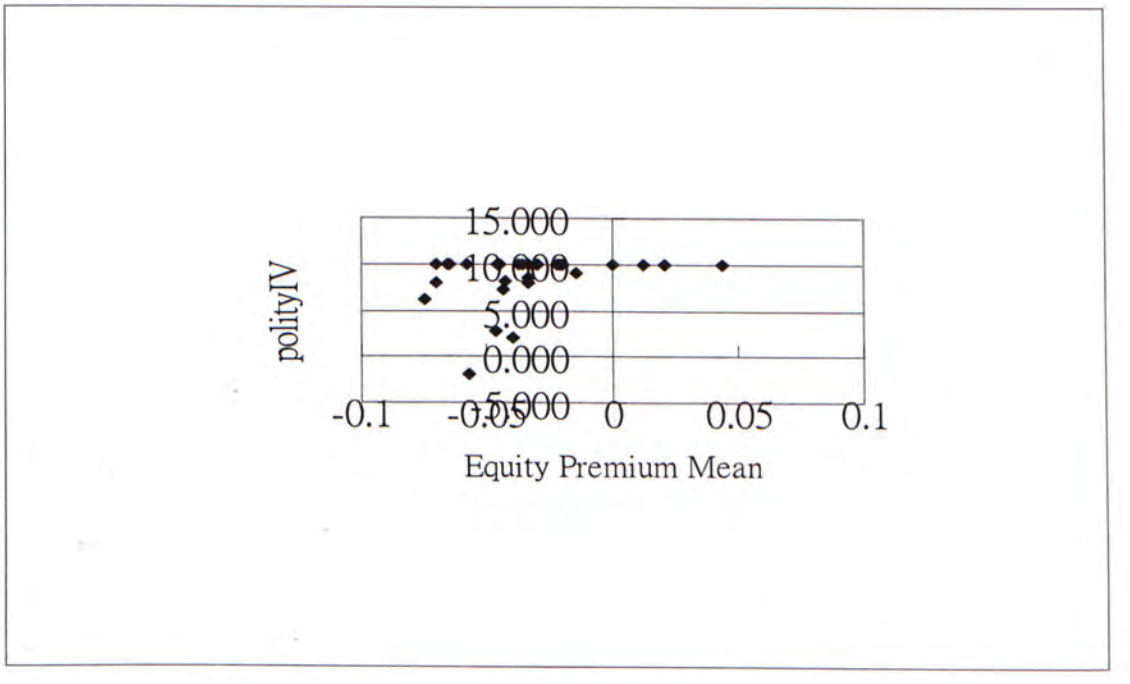

Figure 3.15: The relationship between Equity Premium Mean and Score of democracy in the 90s

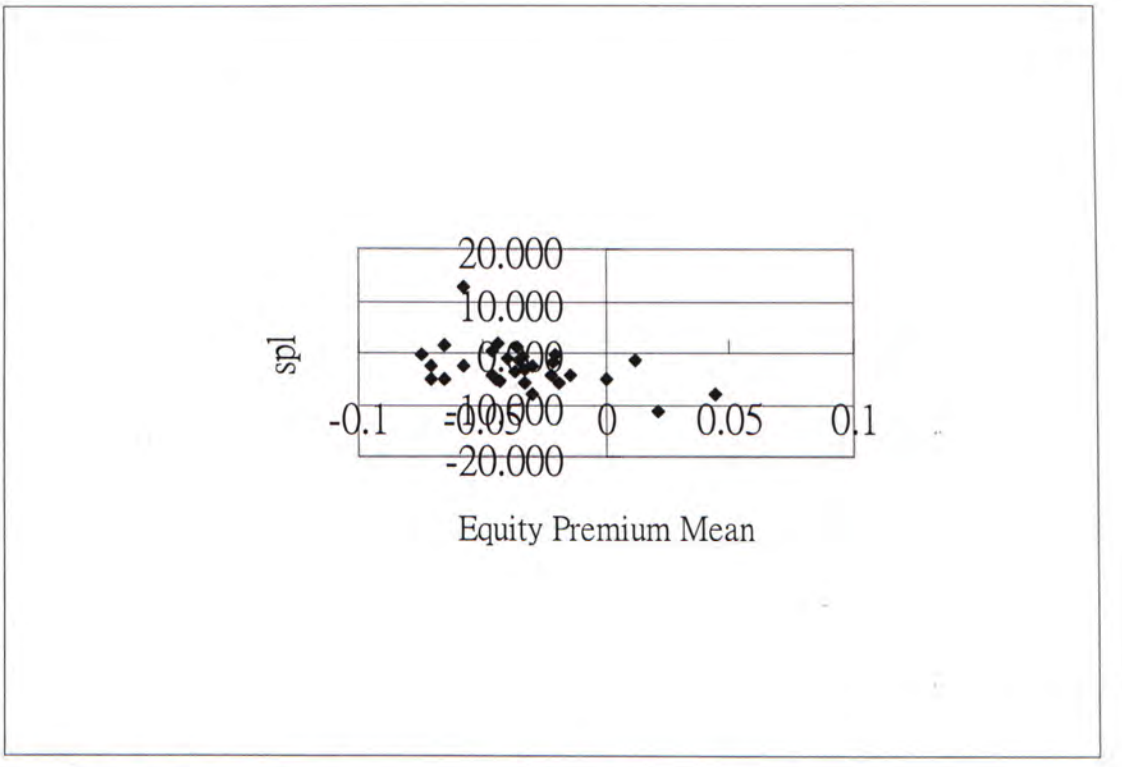

Figure 3.16: The relationship between Equity Premium Mean and Central government budget surplus or deficit as a percentage of GDPin the 90s

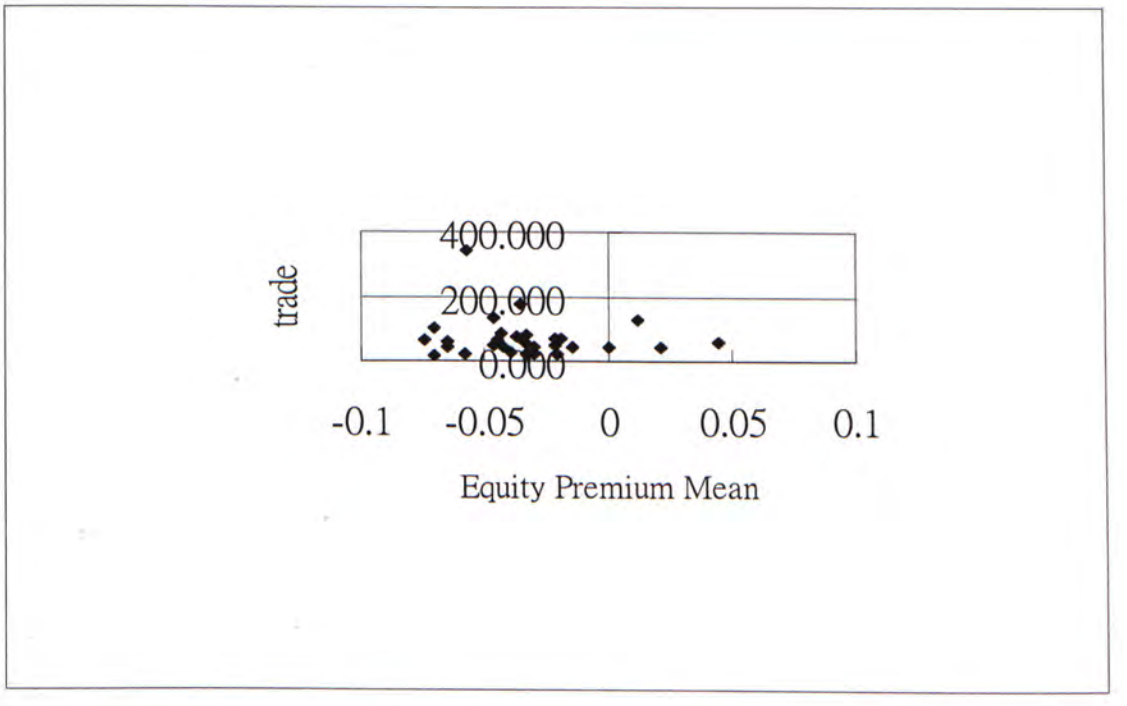

Figure 3.17: The relationship between Equity Premium Mean and Sum of exports and imports of goods and services measured as a share of GDP in the 90s

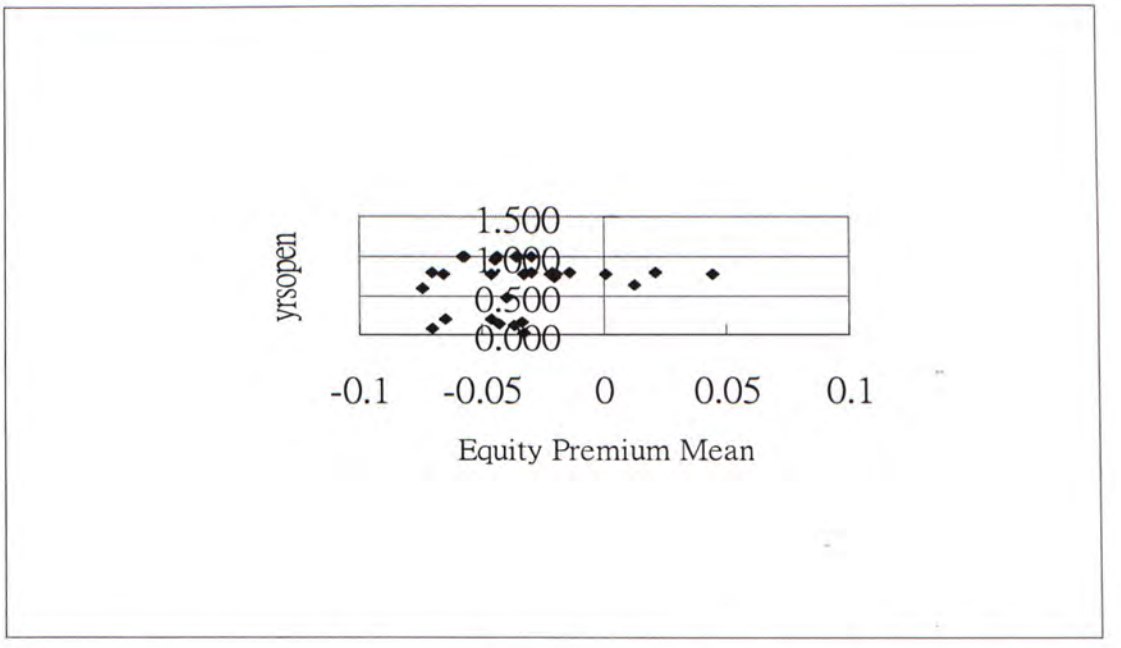

Figure 3.18: The relationship between Equity Premium Mean and Index for openness to international trade in the 90s

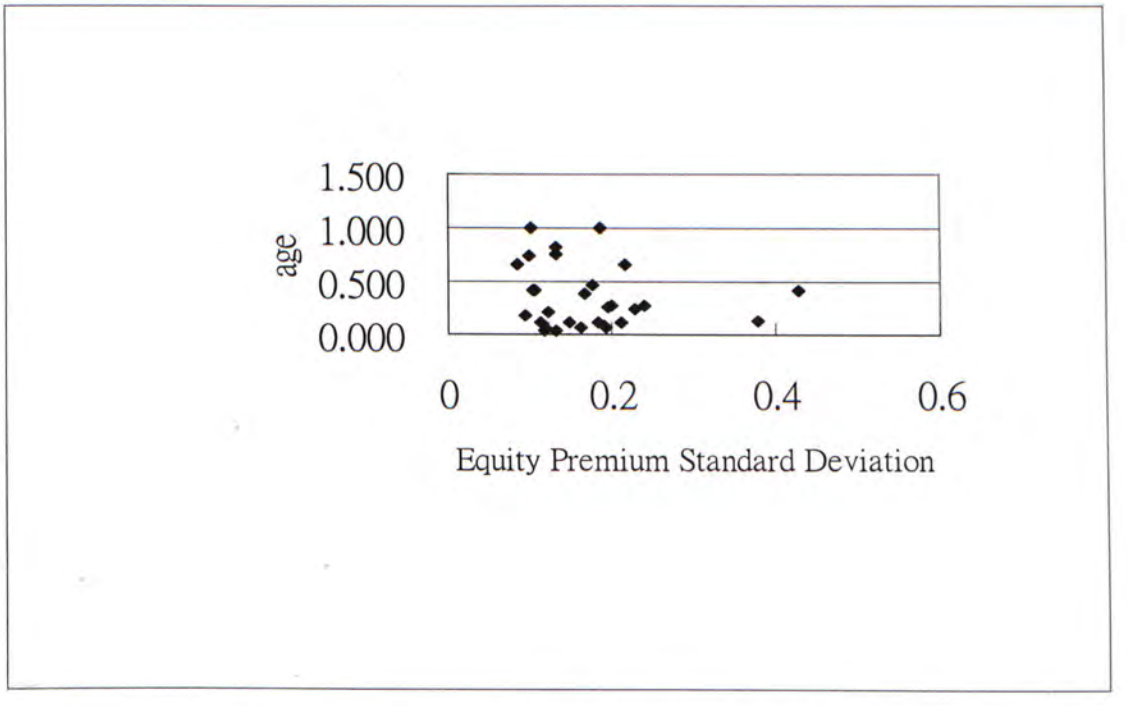

Figure 3.19: The relationship between Equity Premium Standard Deviation and Age of democracy in the 90s

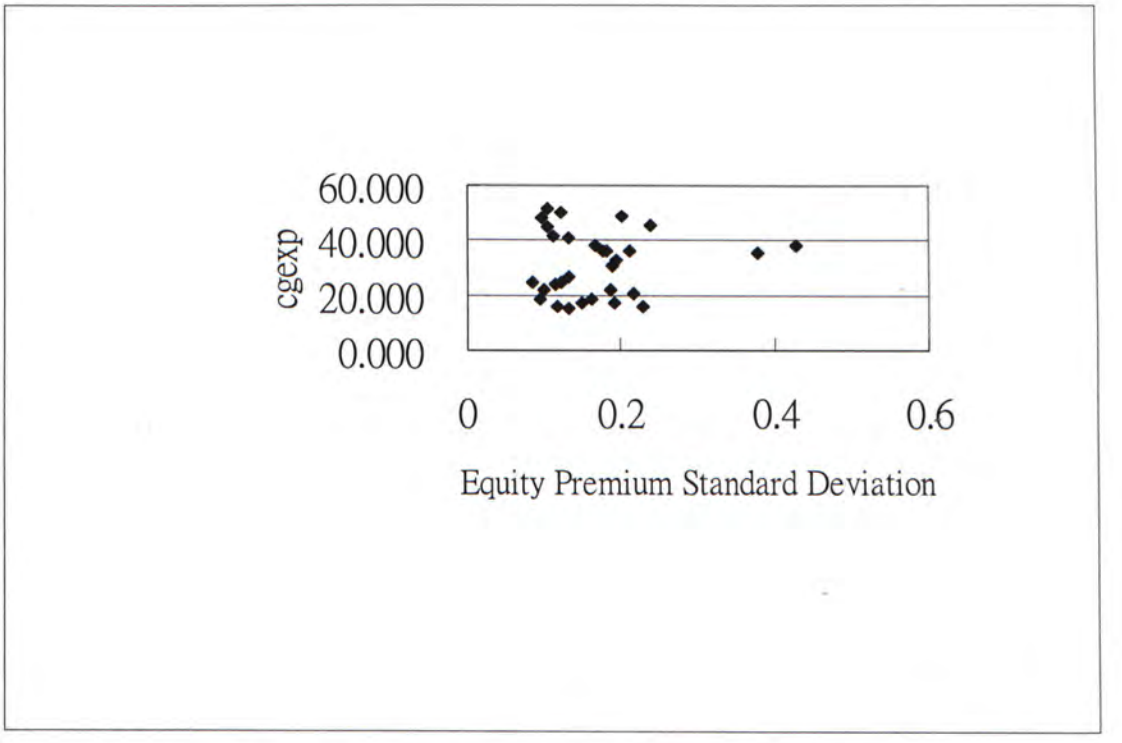

Figure 3.20: The relationship between Equity Premium Standard Deviation and Central government expenditures as a percentage of GDP in the 90s

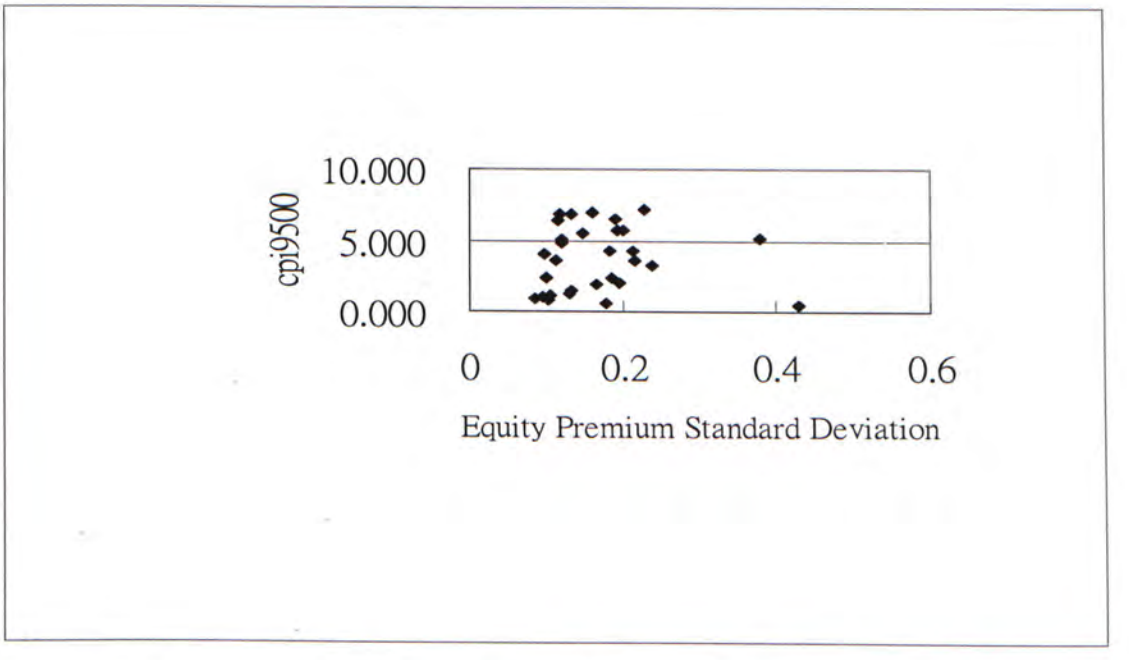

Figure 3.21: The relationship between Equity Premium Standard Deviation and Corruption Perception Index in the 90s

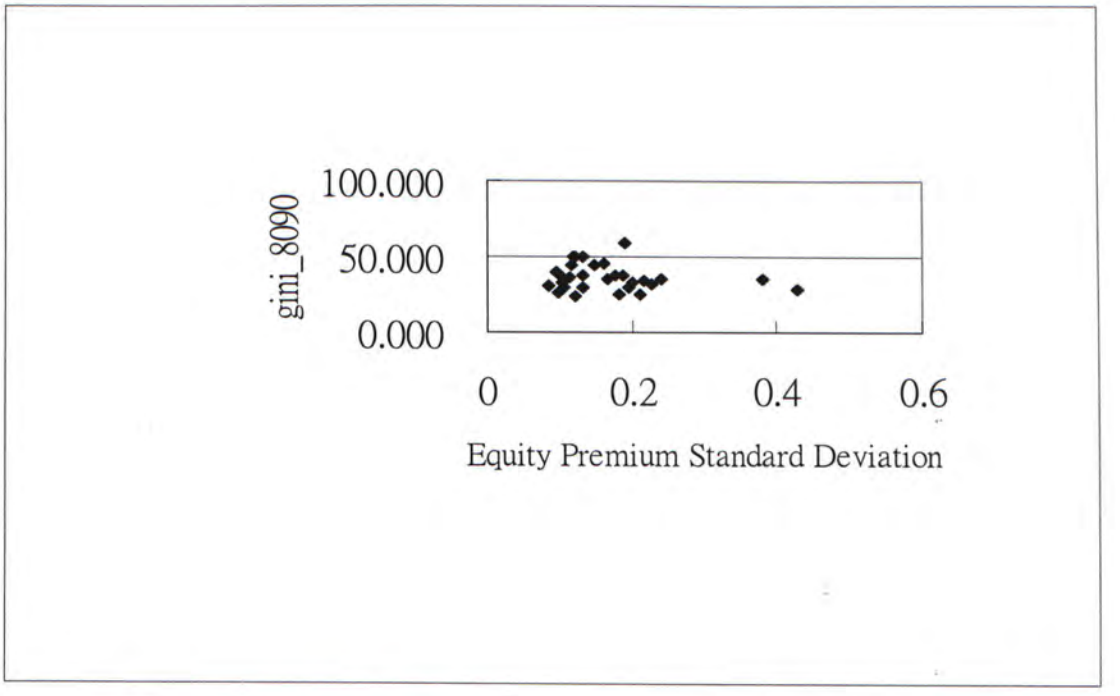

Figure 3.22: The relationship between Equity Premium Standard Deviation and Gini Index on income distribution in the 90s

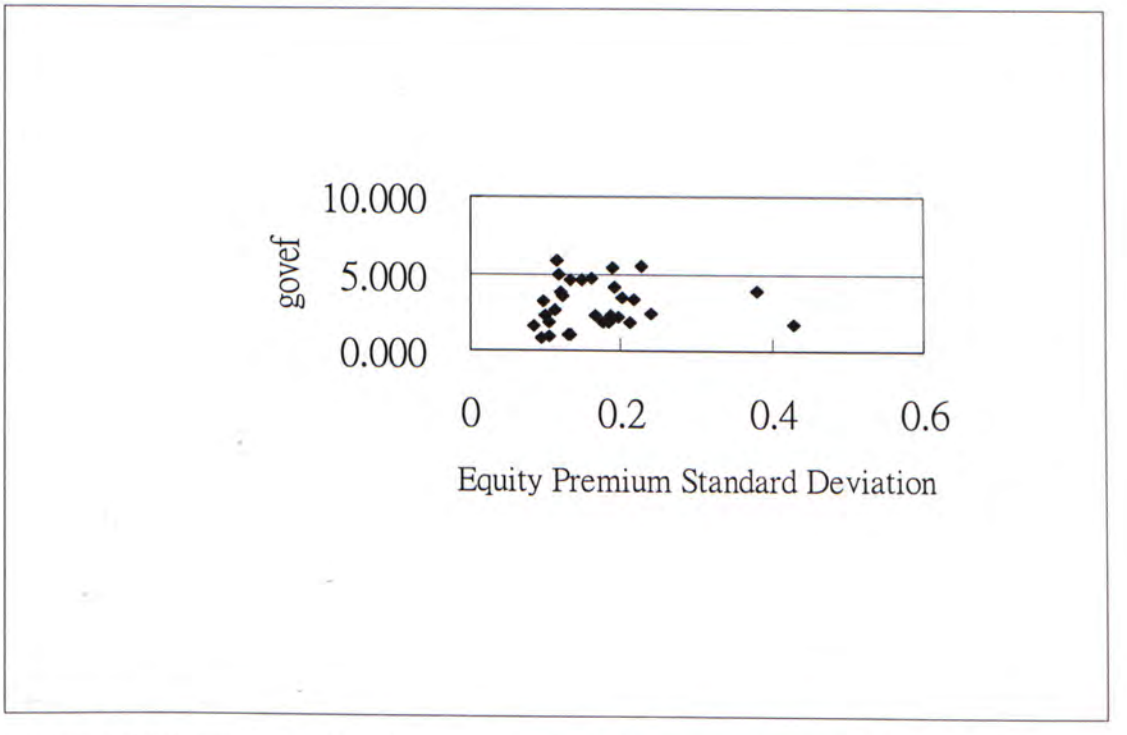

Figure 3.23: The relationship between Equity Premium Standard Deviation and Government Effectiveness in the 90s

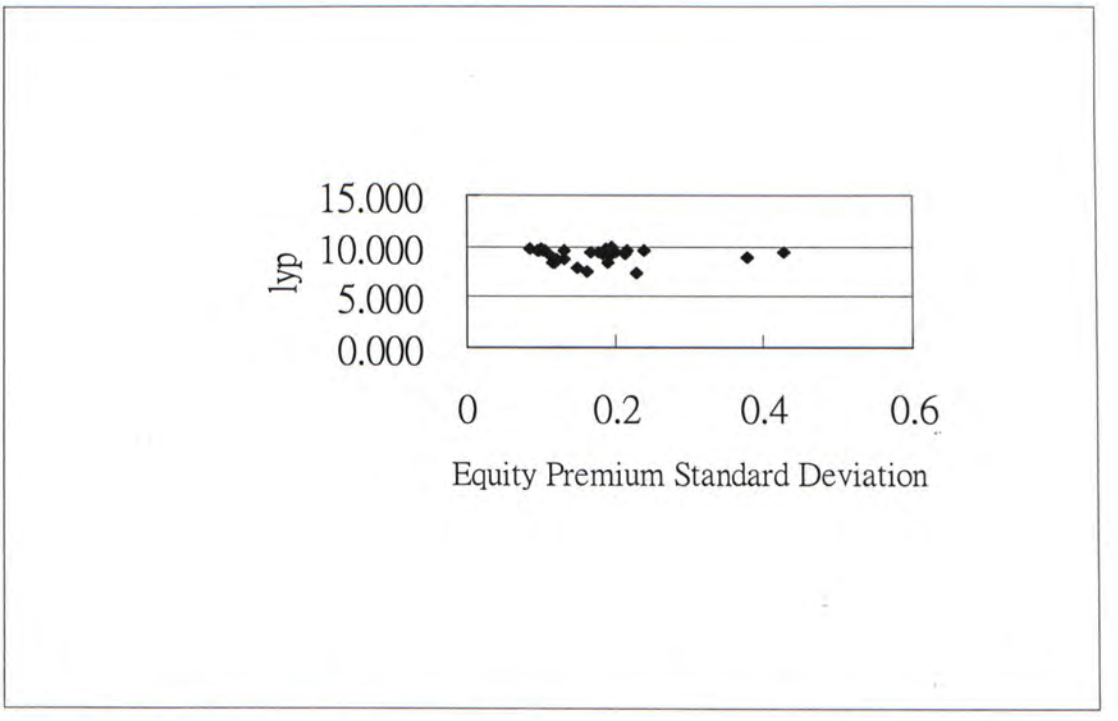

Figure 3.24: The relationship between Equity Premium Standard Deviation and Natural log of per capita real GDP in the 90s

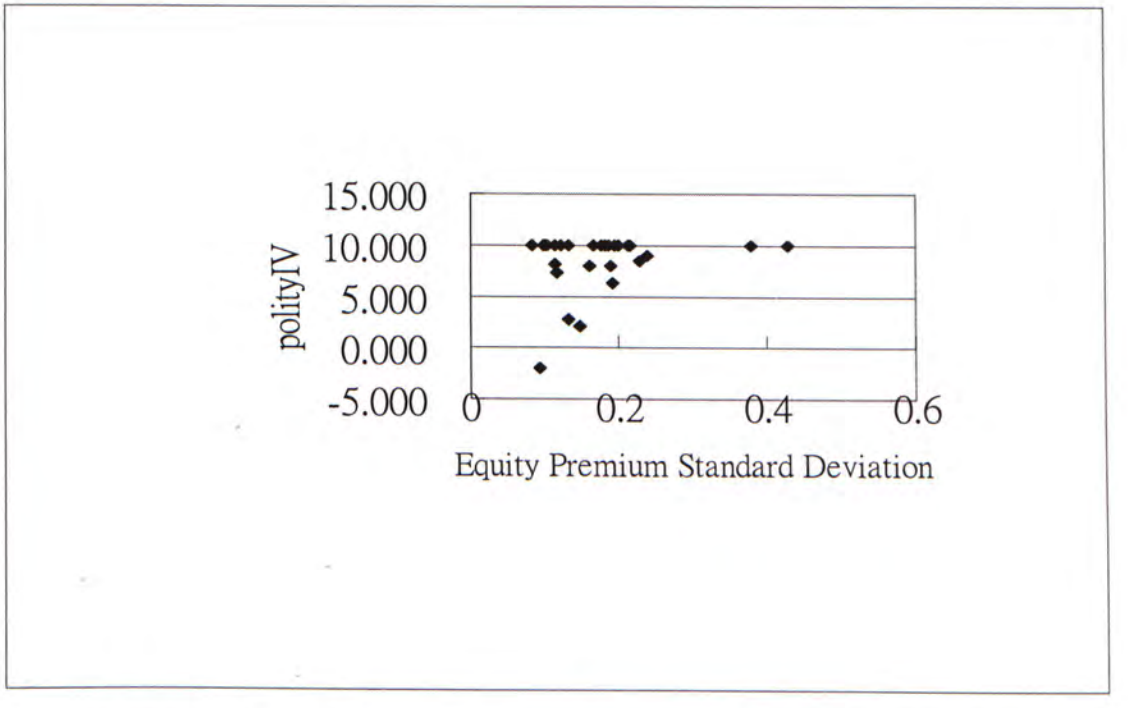

Figure 3.25: The relationship between Equity Premium Standard Deviation and Score for democracy in the 90s

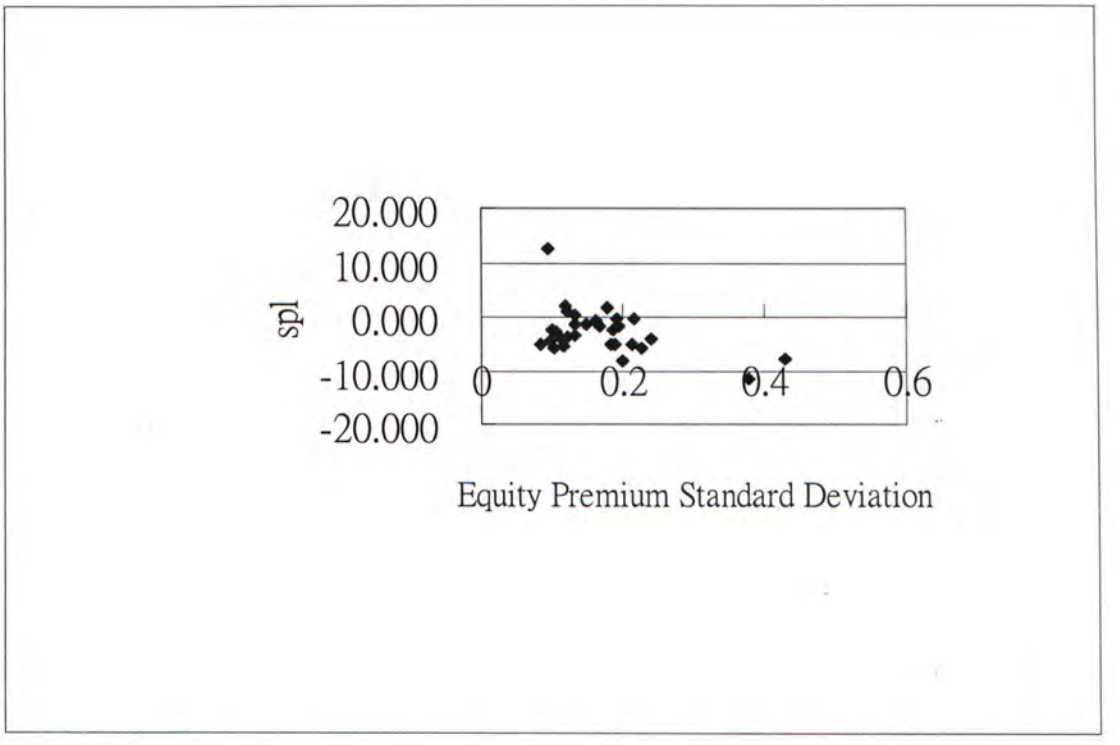

Figure 3.26: The relationship between Equity Premium Standard Deviation and Central government budget surplus or deficit as a percentage of GDP in the 90s

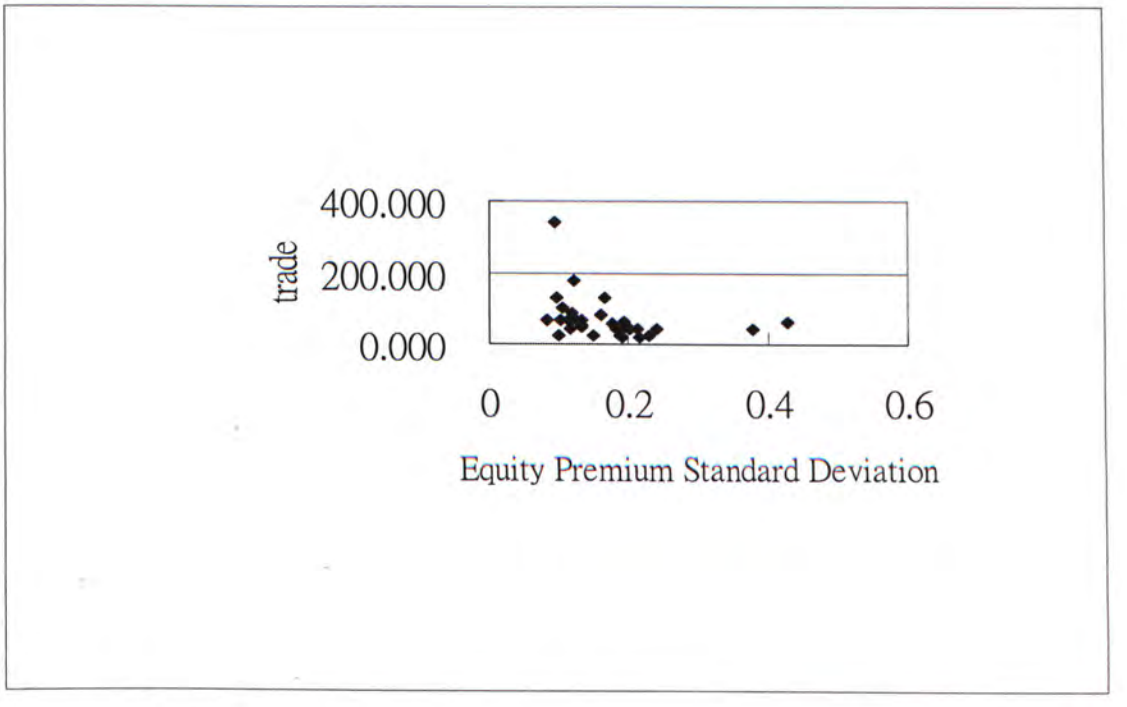

Figure 3.27: The relationship between Equity Premium Standard Deviation and Sum of exports and imports of goods and services measured as a share of GDP in the 90s

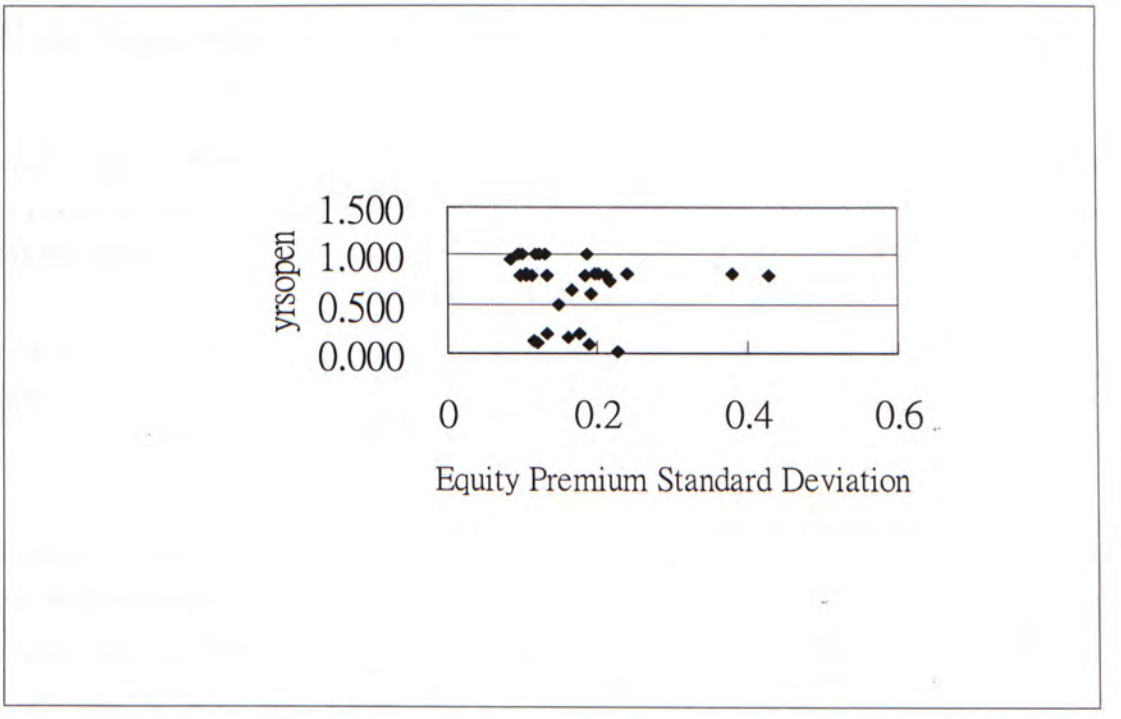

Figure 3.28: The relationship between Equity Premium Standard Deviation and Index for openness to international trade in the 90s

Data Appendix

AGE: age of democracy, defined as: AGE = (2000 – DEM AGE)/200 and varying between 0 and 1, with US being the oldest democracy (value of 1). Source: see DEM_AGE.

CA: It is the Current Account in the Balance of payments which is the credit lines minus the debit lines of goods, services, income and current transfers. Source: International Financial Statistics

CGEXP : central government expenditures as a percentage of GDP, constructed using the item Government Finance - Expenditures in the IFS, divided by GDP at current prices and multiplied by 100. Source: IMF – IFS CD-Rom and IMF - IFS Yearbook.

CPI9500: corruption perception index, measuring perceptions of abuse of power from public officials. Average of the CPI Index over the period 1995-2000, which ranges from 0 to 10, with higher values denoting more corruption. Source: Transparency International (www.transparency.de) and Internet Center for Corruption Research (www.gwdg.de/~uwvw).

FA: It is the financial Account which is the net sum of the balance of direct investment, portfolio investment, and the other investment transactions. Source: International Financial Statistics

GB: It is the government budget surplus or deficit which is calculated as the difference between revenue and expenditure. Source: International Financial Statistics

GDP: GDP is gross domestic product, measured as local currency. Source: International Financial Statistics (IFS)

GINI 8090: Gini index on income distribution, computed as the average of two data points: the observation closest to the 1980 and the observation closest to the 1990. When only one of the two years year is available, only that year is included. Source: Deininger and Squire (1996).

GOVEF: point estimate of "Government Effectiveness", the third cluster of the

Kaufmann et al.(1999a) governance indicators. It combines perceptions of the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies into a single grouping. It ranges from around 0 to around 10 (lower values correspond to better outcome). Sources: Kaufmann et al. (1999a.), available at http://www.worldbank.org/wbi/gac.

I: US 3-month Treasury Bill rate. Sources: http://research.stlouisfed.org/fred2/

IR: The inflation rate of the respected country. Source: International Financial Statistics

KA: It is the Capital Account in the Balance of Payments refers mainly to the capital transfers linked to the acquisition/disposal of a fixed asset or to the financing of capital formation plus the disposal/acquisition of nonproduced, nonfinancial assets. It is the credit items minus the debit items of the capital account. Source: International Financial Statistics

LYP: natural log of per capita real GDP (RGDP H). RGDP H is defined as real GDP per capita in constant dollars (chain index) expressed in international prices, base year 1985. Data through 1992 are taken from the Penn World Table 5.6 (variable named RGDPC), while data on the period 1993-98 are computed from data taken from the World Development Indicators, the World Bank. These later observations are computed on the basis of the latest observation available from the Penn Word Tables and the growth rates of GDP per capita in the subsequent years computed from the series of GDP at market prices (in constant 1995 U.S. dollars) and population, from the World Development Indicators. Sources: Penn World Tables - mark 5.6 (PWT), available on http://datacentre2.chass.utoronto.ca/pwt/docs/topic.html. The World Bank's World Development Indicators; www.worldbank.org.

M1: M1 includes transferable deposits, currency outside banks, demand deposits other than those of central government, private sector demand deposits with the postal checking system and with the Treasury. Source: International Financial Statistics

M2: M2 is M1 plus time, savings, and foreign currency deposits of resident sectors other than central government. Source: International Financial Statistics

M3: M3 is M2 plus large-denomination time deposits, money market mutual fund share(institutional), term repurchase agreements and term Eurodollars. Source: International Financial Statistics

POLITY IV : score for democracy, computed by subtracting the AU T OC score from the DEMOC score, and ranging from +10 (strongly democratic) to -10 (strongly autocratic). Source: Polity IV Project (http://www.cidcm.umd.edu/inscr/p)

PR: It is the major stock price index quarterly return in the corresponding country. Sources: Datasteam in the main library of the Chinese University of Hong Kong

SPL: central government budget surplus (if positive) or deficit (if negative), as a percentage of GDP, constructed using the item Government Finance - Deficit and Surplus in the IFS, divided by the GDP at current prices and multiplied by 100. Source: IMF - IFS CD-Rom and IMF - IFS Yearbook.

TI: Deposit Rate/Money Market Rate/Treasury Bill rate of corresponding country. It represents the short-term money market rate. Deposit rate: It is the rate offered to resident customers for demand, time, or savings deposits. Money Market Rate: It is the rate at which short-term borrowings are effected between financial institutions. Treasury Bill Rate: It is the rate at which short-term government paper is issued or traded in the market. Sources: International Financial Ststistics.

TRADE: sum of exports and imports of goods and services measured as a share of GDP. Source: The World Bank's World Development Indicators CD-Rom 2000.

YRSOPEN: index for openness to international trade, compiled by 10 Sachs and Werner (1995), measuring the fraction of years during the period 1950-1994 that the economy has been open and ranging between 0 and 1. Source: Hall and Jones (1999).

BIBLIOGRAPHY

Apostolos, Serletis, 1995. Random walks, breaking trend functions, and the chaotic structure of the velocity of money. Journal of Business & Economic Statistics, Vol. 13, No.4 page 453-458.

Bordo, Michael D., Lars Jonung, and Pierre L. Siklos, 1997. Institutional Change and the Velocity of Money: A Century of Evidence. Economic Inquiry, 35(4): 710-24.

Blanchard, Oliver Jean. 1993. Movements in the equity premium. Brookings Papers on Economic Activity, Macroeconomics 2: 75-118.

Bordo, Michael D., and Lars Jonung, 1981. The Long-Run Behavior of the Income Velocity of Money in Five Advanced Countries, 1870-1975: An Institutional Approach. Economic Inquiry, 96-116:

Bordo, Michael D., and Lars Jonung, 1987. The Long-Run Behavior of the Velocity of Circulation: The International Evidence. Cambridge: Cambridge University Press.

Bordo, Michael D., and Lars Jonung, 1990. The Long-Run Behavior of Velocity: The Institutional Approach Revisited. Journal of Policy Modeling, 12(2):165-197.

Canova Fabio, Fianni de Nicolo. 2003 The properties of the equity premium and the risk-free rate: an investigation across time and countries. IMF staff paper. Vol. 50. No. 2.

Cole, Harold L. and Lee E. Ohanian, 2002. Shrinking money the demand for money and the nonneutrality of money. Journal of Monetary Economics, 49 653-686.

Dickey, David and Wayne A. Fuller, 1979. Distribution of the Estimates for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association, 74 427-31.

Enders, Walter 1995, Applied Econometric Time Series, NY: Wiley.

Fama, Eugene F. and French, Kenneth R. 2001. The equity premium. Working Paper 522. Center for Research in Security Prices, Graduate School of Business, University of Chicago.

Fama, Eugene F. and French, Kenneth R. 2002. The equity premium. Journal of Finance. Vol Lvil No. 2.

Friedman, Milton, and Anna J. Schwatz, 1982. Monetary Trends in the United States and the United Kingdom: Their Relation to Income Prices, and Interest Rates, 1867-1975. Chicago: University of Chicago Press for N.B.E.R.

Friedman, Milton, 1988. Lessons on Monetary Policy from the 1980s. Journal of Economic Perspectives, Vol. 2, Issue 3, 51-72.

Fisher, Irving, 1911. The purchasing power of money. The Macmillan Company.

Goodhart, Charles A. E., 1982. Monetary Trends in The United States and The United Kingdom: A British Review. Journal of Economic Literature, Vol. 20, No. 4, pp. 1540-1551.

Gordon, Myron J. 1962. The investment, financing and valuation of the corporation. Homewood, Ill; Irwin.

Granger, C., 1969. Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. Econometrica, 37(3), 424-38.

Greene, William H. 2000, Econometric Analysis, 4th edition, NJ: Prentice Hall.

Hall, Robert E., 1982. Monetary Trends in The United States and The United Kingdom: A Review from the Perspective of New Developments in Monetary Economics. Journal of Economic Literature, Vol. 20, No. 4, pp. 1552-1556.

International Monetary Fund (IMF), IMF Financial Data. Varies Dates. Government Bond Yield, Best Lending Rate for Korea, National Income and Consumer Price Indices.

Ireland, Peter N., 1991. Financial evolution and the long-run behavior of velocity: new evidence from U.S. regional. Federal Reserve Bank of Richmond Economic Review.

Jagannathan, Ravi, McGrattan, Ellen R. and Scherbina, Anna. 2000. The declining U.S. Premium. Federal Reserve Bank of Minneapolis Quarterly Review Vol. 24 No. 4 Fall 2000: 3-19.

Karfakis, Costas, 2002. Testing the quantity theory of money in Greece. Applied

Economics, 34, 583-587.

Kocherlakota, Narayana R. 1996. The equity Premium: It's still a puzzle. Journal of Economic Literature 34 (march): 42-71.

Lardaro, Leonard, 1993 Applied Econometrics. HarperCollins College Publishers.

Lattau Martin, Ludvigson Syndey C., Wachter, Jessica A. 2003. The decling equity premium: what role does macroeconomic risk play. New York University, Working in progress.

Mayer, Thomas, 1982. Monetary Trends in The United States and The United Kingdom: A Review Article. Journal of Economic Literature, Vol. 20, No. 4, pp. 1528-1539.

Mehra, R., and E.C. Prescott (1985). The Equity Premium Puzzle. Journal of Monetary Economics, 15, 145-161.

Mishkin, Frederic S. 1997. The economics of money, banking, and financial markets. Addison-Wesley.

Mushing, Jerry, 2002. Output and the role of money, World Scientific Publishing Co. Pte. Ltd.

Payne, James E; Ewing, Bradley T., 1998. Money Market Rate Variability and the Velocity of Money: Some International Evidence. Journal of Applied Business Research, 14(2): 75-82.

Persson, Torsten; Tabellini, Guido, 2003. The economic effects of constitutions. Cambridge, Mass.: MIT Press.

Sims, C. A., 1972. Money, Income and Causality. American Economic Review, 62(4), 540-52.

— 1980, "Macroeconomics and Reality", Econometrica, 48(1), 1-48.